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MAINTENANCE INTERVALS

Operation and Maintenance
Manual Excerpt

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SEBU8075-11
January 2012

Operation and Maintenance Manual

992K Wheel Loader

H4C1-Up (Machine)

i04749293

Maintenance Interval Schedule

SMCS Code: 7000

Ensure that all safety information, warnings, and instructions are read and understood before any operation or any maintenance procedures are performed.

The user is responsible for the performance of maintenance. All adjustments, the use of proper lubricants, fluids, filters, and the replacement of components due to normal wear and aging are included. Failure to adhere to proper maintenance intervals and procedures may result in diminished performance of the product and/or accelerated wear of components.

Use mileage, fuel consumption, service hours, or calendar time, WHICH EVER OCCURS FIRST, in order to determine the maintenance intervals. Products that operate in severe operating conditions may require more frequent maintenance. Refer to the maintenance procedure for any other exceptions that may change the maintenance intervals.

Note: Before each consecutive interval is performed, all maintenance from the previous interval must be performed.

Note: If Cat HYDO Advanced hydraulic oils are used, the hydraulic oil change interval is extended to 3000 hours. S·O·S services may extend the oil change even longer. Consult your Cat dealer for details.

When Required

Automatic Lubrication Grease Tank - Fill 96
Automatic Lubrication System Components - Check 96
Axle Oil Cooler Filter - Replace 100
Battery - Recycle 101
Battery or Battery Cable - Inspect/Replace 102
Camera - Clean 109
Case Drain Oil Filters - Replace 109
Circuit Breakers - Reset 110
Engine Air Filter Primary Element - Clean/Replace 120
Engine Air Filter Secondary Element - Replace .. 123
Ether Starting Aid Cylinder - Replace 128
Fuel System - Prime 128
Fuses - Replace 132
High Intensity Discharge Lamp (HID) - Replace .. 134
High Pressure Screens - Clean/Replace 134
Oil Filter - Inspect 148
Oil Renewal System Oil - Add 149
Radiator Core - Clean 149
Seat Side Rails - Adjust 152
Secondary Steering - Test 152
Transmission Magnetic Screen - Clean 155
Window Washer Reservoir - Fill 159
Window Wiper - Inspect/Replace 159
Windows - Clean 159

Every 10 Service Hours or Daily

Backup Alarm - Test 101
Bucket Cutting Edges - Inspect/Replace 105
Bucket Linkage and Loader Cylinder Bearings - Lubricate 105
Bucket Stops - Inspect 106
Bucket Tips - Inspect/Replace 106
Bucket Wear Plates - Inspect/Replace 108
Cooling System Coolant Level - Check 113
Engine Oil Level - Check 124
Fuel System Primary Filter (Water Separator) - Check/Drain 129
Hydraulic System Oil Level (Implement) (Hydraulic Fan) - Check 146
Hydraulic System Oil Level (Steering) (Brake) - Check 146
Oil Renewal System Oil Level - Check 149
Seat Belt - Inspect 151
Transmission Oil Level - Check 157

Every 50 Service Hours or Weekly

Cab Air Filter - Clean/Replace 108
Fuel Tank Water and Sediment - Drain 132
Tire Inflation - Check 154

Initial 250 Service Hours

Hydraulic System Oil Filter (Hydraulic Fan Return) - Replace 143
Hydraulic System Oil Filter (Implement Pilot) - Replace 144
Hydraulic System Oil Filter (Steering Pilot) - Replace 145
Transmission Oil Filter - Replace 157

Every 250 Service Hours or Monthly

Axle Oscillation Bearings - Lubricate 101
Battery - Clean 101
Belt - Inspect/Adjust/Replace 102
Braking System - Test 104
Drive Shaft Spline (Center) - Lubricate 119
Engine Oil Sample - Obtain 125
Steering Cylinder Bearings - Lubricate 154

Initial 500 Service Hours

Electronic Unit Injector - Inspect/Adjust 120
Engine Valve Lash - Check 127
Engine Valve Rotators - Inspect 127
Seat Side Rails - Adjust 152

Initial 500 Hours (for New Systems, Refilled Systems, and Converted Systems)

Cooling System Coolant Sample (Level 2) - Obtain 115

Every 500 Service Hours or 3 Months

Cooling System Coolant Sample (Level 1) - Obtain 114
Differential and Final Drive Oil Level - Check 117
Differential and Final Drive Oil Sample - Obtain .. 118
Engine Crankcase Breather - Clean 124
Engine Oil and Filter - Change 125
Fuel System Primary Filter - Clean/Replace 130
Fuel System Secondary Filter - Replace 131
Fuel Tank Cap and Strainer - Clean 132
Hoses and Clamps - Inspect/Replace 135
Hydraulic System Oil Filter (Hydraulic Fan Return) - Replace 143
Hydraulic System Oil Filter (Implement Pilot) - Replace 144
Hydraulic System Oil Filter (Steering Pilot) - Replace 145
Hydraulic System Oil Sample (Implement) (Hydraulic Fan) - Obtain 147
Hydraulic System Oil Sample (Steering) (Brake) - Obtain 147
Transmission Oil Filter - Replace 157
Transmission Oil Sample - Obtain 158

Every 1000 Service Hours or 6 Months

Articulation Bearings - Lubricate 95
Battery Hold-Down - Tighten 102
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Rollover Protective Structure (ROPS) - Inspect .. 151
Transmission Oil - Change 155

Every 2000 Service Hours or 1 Year

Axle Breaker Relief Valve - Clean 99
Brake Accumulator - Check 103
Differential and Final Drive Oil - Change 116
Hydraulic System Oil (Implement) (Hydraulic Fan) - Change 138
Hydraulic System Oil (Steering) (Brake) - Change 140
Hydraulic Tank Breaker Relief Valve - Clean 148
Refrigerant Dryer - Replace 150
Service Brake Wear Indicator - Check 153

Every Year

Cooling System Coolant Sample (Level 2) - Obtain 115

Every 3000 Service Hours

Electronic Unit Injector - Inspect/Adjust 120
Engine Valve Lash - Check 127
Engine Valve Rotators - Inspect 127

Every 3000 Service Hours or 2 Years

Crankshaft Vibration Damper - Inspect 116
Engine Mounts - Inspect 124

Every 3 Years

Seat Belt - Replace 152

Every 5000 Service Hours or 3 Years

Alternator - Inspect 95
Turbocharger - Inspect 158

Every 6000 Service Hours or 3 Years

Cooling System Coolant Extender (ELC) - Add ... 112
Engine Water Pump - Inspect 127

Every 6000 Service Hours or 4 Years

Cooling System Water Temperature Regulator - Replace 115

Every 7500 Service Hours or 757 000 L (200 000 US gal) of Fuel

Engine Components - Rebuild/Install Reman 124

Every 12 000 Service Hours or 6 Years

Cooling System Coolant (ELC) - Change 111

i02904968

Alternator - Inspect

SMCS Code: 1405-040

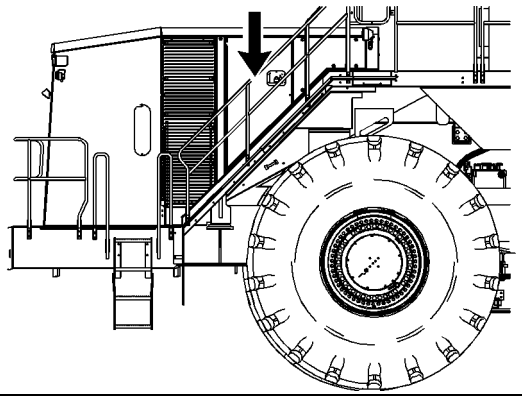


Illustration 85 g01224924

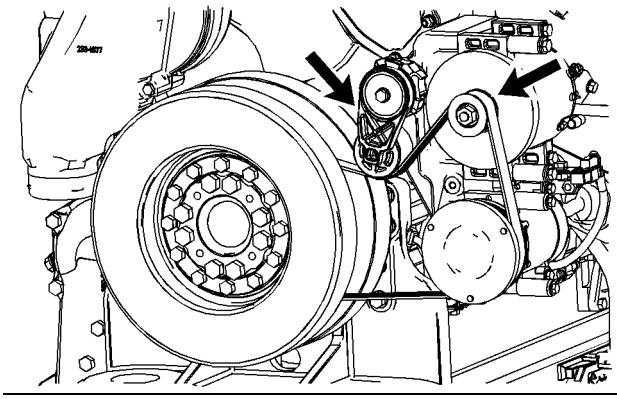


Illustration 86 g01445914

Access to the alternator is on the right side of the machine. The alternator is located on the front of the engine.

Caterpillar recommends a scheduled inspection of the alternator. Inspect the alternator for loose connections and for proper battery charging.

Keep the batteries fully charged.

Air temperature affects the cranking power of the batteries. Keep the batteries warm. The engine will not crank if the batteries are too cold. A warm engine will not crank if the batteries are too cold.

When the engine is operated only for short periods of time, the batteries may not fully recharge. Make sure that the alternator is properly functioning. The alternator will charge the battery.

Consult your Caterpillar dealer for more information about testing the alternator.

i02597645

Articulation Bearings - Lubricate

SMCS Code: 7057-086-BD; 7065-086-BD; 7066-086-BD

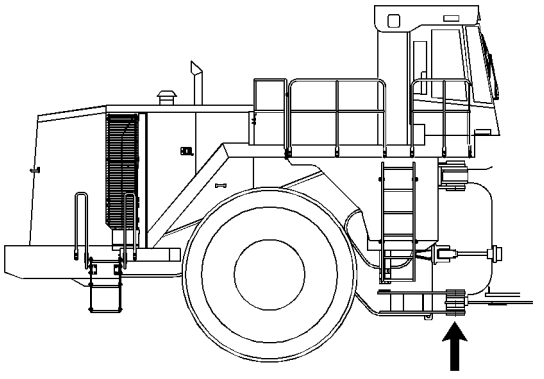


Illustration 87 g01300320

1. The fitting for the lower hitch pin is located at the lower bearing. The fitting can be accessed from the right side of the machine. Wipe off the fitting before any lubricant is applied.

2. Apply lubricant through the fitting.

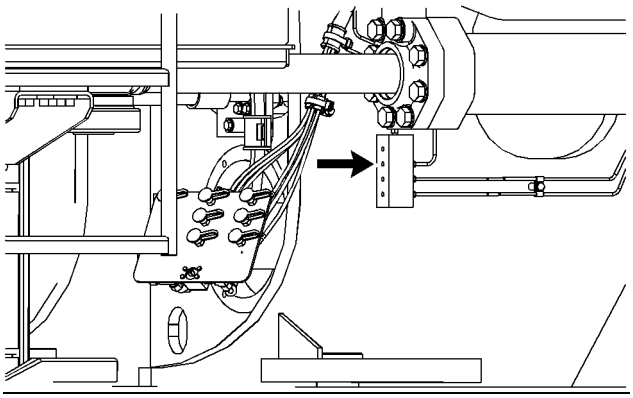


Illustration 88 g01450896

3. The remote fitting for the upper hitch pin is located near the articulation joint on the right side of the machine. Wipe off the fitting before any lubricant is applied.

4. Apply lubricant through the remote fitting.

i02216552

Automatic Lubrication Grease Tank - Fill (If Equipped)

SMCS Code: 7540-544-TNK

⚠ WARNING

A pressure hazard is present. Severe personal injury or death can result from removing hoses or fittings that are under pressure. Relieve the pressure in the system before you remove hoses or fittings.

The Centro-Matic Lubrication System

Reference: Before any service work is performed on the lubrication system, refer to Special Instructions, REHS1394 or consult your Caterpillar dealer.

Bulk Fill

1. In order to fill the reservoir, remove the lower and upper plugs from the side of the reservoir.
2. Attach the appropriate pump to the lower inlet.
3. Fill the reservoir until visual indicator on the lid of the tank indicates FULL or until the grease appears at the top vent port.

   Reference: For the correct type of grease, refer to Operation and Maintenance Manual, “Lubricant Viscosities”.
4. Remove the pump and replace both plugs.

The Quicklub Lubrication System

Reference: Before any service work is performed on the lubrication system, refer to Special Instructions, REHS1396 or consult your Caterpillar dealer.

Filling the Reservoir

1. Fill the reservoir through the grease fitting. The grease fitting is located at the base of the reservoir.

   Reference: For the correct type of grease, refer to Operation and Maintenance Manual, “Lubricant Viscosities”.
2. Refill the reservoir when the grease reaches the “MIN” mark on the reservoir.
3. Fill the reservoir to the “MAX” mark on the reservoir.

Priming the System

After the reservoir has been filled with the recommended lubricant, loosen the fitting to the supply line. Operate the pump until lubricant flows from the outlet. Then, tighten fitting.

i04164902

Automatic Lubrication System Components - Check (If Equipped)

SMCS Code: 7540-535

⚠ WARNING

A pressure hazard is present. Severe personal injury or death can result from removing hoses or fittings that are under pressure. Relieve the pressure in the system before you remove hoses or fittings.

Reference: Before any service work is performed on the lubrication system, refer to Special Instructions, REHS1394 or consult your Cat dealer.

Autolube systems need to be adjusted before being put into use to ensure each joint gets the appropriate amount of grease. Different applications require frequency, volume, and proportioning adjustments from the recommended or factory settings.

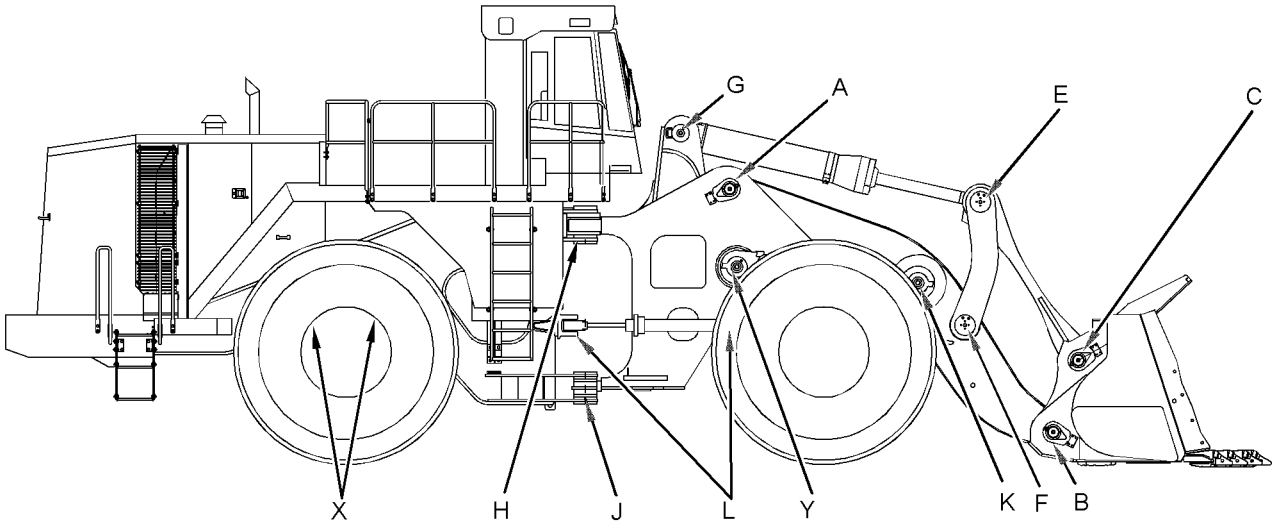


Illustration 89 g01032039

(A) A-Pin
(B) B-Pin
(C) C-Pin
(E) E-Pin
(F) F-Pin
(G) G-Pin
(H) Pin for Upper Articulation Joint
(J) Pin for Lower Articulation Joint
(K) K-Pin
(L) Steering Cylinder Pins
(X) Trunnions
(Y) Y-Pin

1. Remove any buildup of grease. Check that each pin joint is receiving a fresh supply of grease.

   Reference: If a fresh supply of grease is not present, refer to Special Instructions, REHS1394 for system troubleshooting procedures.

2. Check the grease level at the top vent port of the reservoir.

   Reference: For filling procedures, refer to Operation and Maintenance Manual, “Automatic Lubrication Grease Tank - Fill”.

Settings of the Injectors for the Autolube System

The controller of the autolube system is preset from the factory. The lubrication is dispensed at 15 minute intervals, and all of the injectors are preset at the full flow setting. There may be an excessive buildup of grease around some of the joints. As a result, the grease reservoir may need filling more frequently. The injectors for selected joints can be adjusted in order to reduce the flow of grease without adversely affecting the life of the pin. The injectors are set by the factory at the full flow setting. This setting is equivalent to 8 turns open. When the injectors are adjusted, the injectors should first be closed. Then, the injectors should be opened by the number of specified turns. The recommended settings for the injectors at each pin location are listed in Table 17.

Table 17

Pins	Qty (Injectors)	Settings (Turns)
A	0	8
B	2	
C	2	
E	3	5
F	2	2
G	1	8
H	1	2
J	1	
K	0	8
L	4	2
X	2	8
Y	0	8

Note: By using the above settings, the buildup of grease will be reduced. The interval between refills of the reservoir will be extended to approximately 250 hours. Grease levels in the reservoir must be checked in order to ensure an uninterrupted flow.

Timer Operation

Autolube systems must be adjusted before being put into use to ensure each joint gets the appropriate amount of grease. Different applications require frequency, volume, and proportioning adjustments from the recommended or factory settings.

Autolube settings must be monitored and adjusted as needed to account for changes in application, temperature, grease type, and NLGI grade.

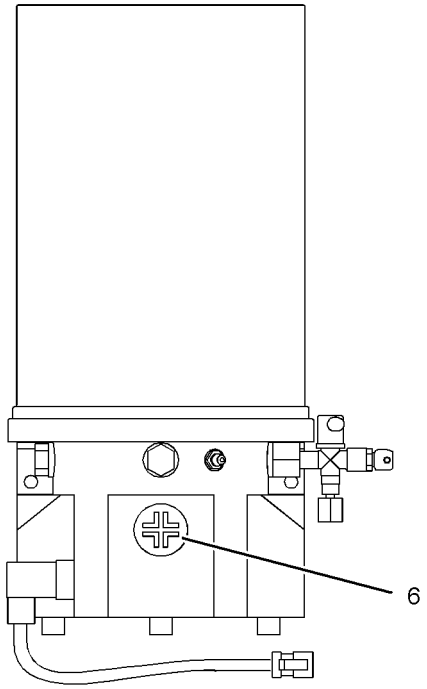


Illustration 90 g01239276

(6) Access plug

Remove access plug (6) on the front of the pump in order to access the timer control. The timer control group consists of the following:

- Manual lubrication switch
- OFF timer rotary switch
- ON timer rotary switch
- Power ON LED
- Pump ON LED

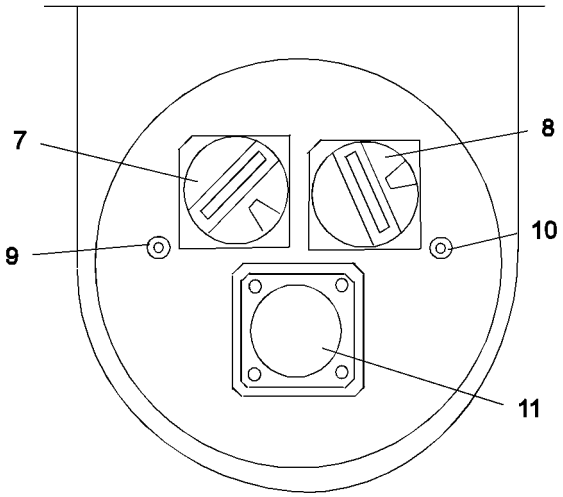


Illustration 91 g01238978

Timer control

(7) OFF timer switch
(8) ON timer switch
(9) Power ON LED.
(10) Pump motor ON LED
(11) Push button for manual lubrication

OFF timer switch (7) can be adjusted to 15 values. See Table 1 for the time interval for each value.

ON timer switch (8) can be adjusted to 15 values. See Table 1 for the time interval for each value.

LED (9) is marked “battery”. This LED will illuminate when power is sent to the pump control.

LED (10) is marked “motor”. This LED will illuminate when the pump is pumping lubricant.

Press push button (11) for 2 seconds. This process will initiate a manual lubrication cycle.

The OFF position of the timer begins accumulating time when the ignition switch closes. When the OFF position of the timer reaches the preset value, the pump will turn ON. The pump remains activated for the time period that is preset on the ON timer.

When the ignition is turned OFF, the used time is saved for an unlimited duration.

Turn the ignition to the ON position. The automatic lubrication operation will finish the cycle time.

Note: Do not use the zero setting that is located on the timer switches.

Note: The factory setting for the OFF position is “4” (16 minutes). The factory setting for the ON position is “2” (4 minutes).

Table 18

OFF TIME Rotary Switch Setting	Interval Between Cycles	ON TIME Rotary Switch Setting	Cycle Time of the Pump
0	0 minutes	0	0 minutes
1	4 minutes	1	2 minutes
2	8 minutes	2	4 minutes
3	12 minutes	3	6 minutes
4	16 minutes	4	8 minutes
5	20 minutes	5	10 minutes
6	24 minutes	6	12 minutes
7	28 minutes	7	14 minutes
8	32 minutes	8	16 minutes
9	36 minutes	9	18 minutes
A	40 minutes	A	20 minutes
B	44 minutes	B	22 minutes
C	48 minutes	C	24 minutes
D	52 minutes	D	26 minutes
E	56 minutes	E	28 minutes
F	60 minutes	F	30 minutes

Note: If the Lincoln 94824 Pump or the printed circuit board are replaced in the field, contact Lincoln Technical Service Department at 314-679-4200 ext. 4782 for instructions on special jumper pin setting for timer operation prior to installation and start up.

i03247100

Axle Breaker Relief Valve - Clean

SMCS Code: 5118-070-ZX

There is a breaker relief valve on both axles. The front axle breaker relief valve is located inside the front frame above the axle housing.

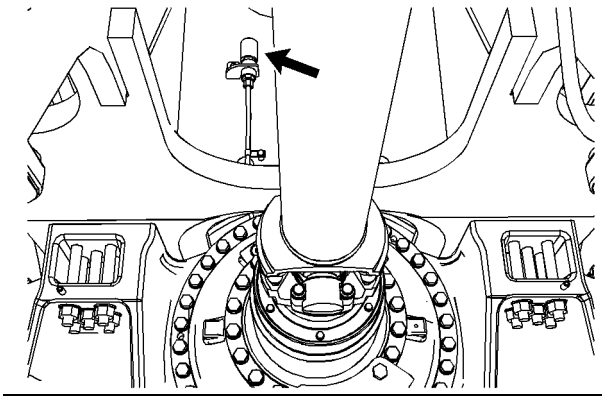


Illustration 92 g01450318

Front axle breaker relief valve

The access door for the rear axle breaker relief valve is located behind the cab in the middle of the cab platform.

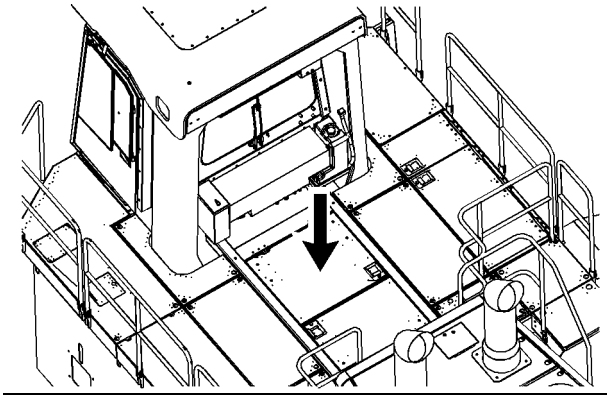


Illustration 93 g01271357

Rear axle breaker relief valve location

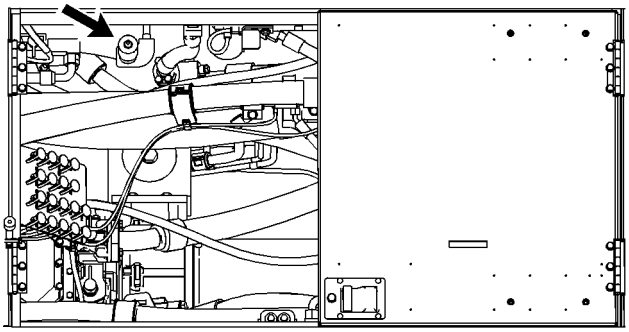


Illustration 94 g01450394

Rear axle breaker relief valve

1. Open the access door in order to access the rear axle breaker relief valve.
2. Push the top of the breaker relief valve in order to relieve any pressure.

3. Remove the breaker relief valve.

4. Clean the breaker relief valve in a clean, nonflammable solvent. Dry the breaker relief valve thoroughly by shaking or by using compressed air.

5. Install the breaker relief valve.

6. Close the access door.

7. Repeat steps 2 through 5 for the front axle breaker relief valve.

i04401714

Axle Oil Cooler Filter - Replace

SMCS Code: 3004-510-AOC

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

The axle oil cooler filter should be replaced when a failure occurs in the axles.

Note: The oil filters contain a 140 micron screen.

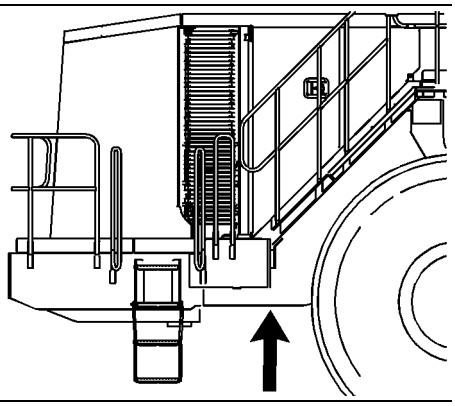


Illustration 95 g02586177

The axle oil cooler filters are located under the engine compartment. There is an access area on the underside of the machine.

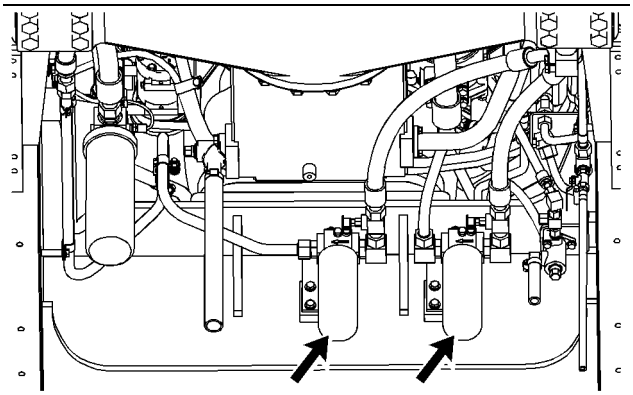


Illustration 96 g01451765

1. Stop the engine.

2. Push the button on the top of each axle breaker relief valve in order to relieve any pressure.

Note: Refer to Operation and Maintenance Manual, “Axle Breaker Relief Valve - Clean” for the axle breaker relief valve locations.

3. Remove the oil filter and discard the filter properly. Make sure that the old seal is removed from the filter base.

4. Clean the filter mounting base and apply a thin coat of oil to the seal on the new filter.

5. Install the new filter hand tight until the seal of the filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the filter, use the rotation index marks as a guide.

6. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide. For non-Caterpillar filters, use the instructions that are provided with the filter.

Note: You may need to use a Caterpillar strap wrench, or another suitable tool, in order to turn the filter to the amount that is required for final installation. Make sure that the installation tool does not damage the filter.

7. Repeat the above steps for the remaining oil filter.

8. Start the engine and operate the machine for a few minutes.

9. Stop the engine. Inspect the filters for leaks. Make any necessary repairs.

i02598561

Axle Oscillation Bearings - Lubricate

SMCS Code: 3268-086-BD; 3278-086-BD

The two grease fittings for the axle oscillation bearings are located near the articulation joint on the left side of the machine.

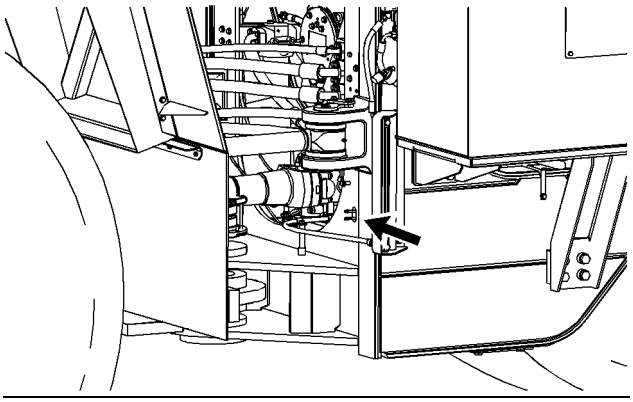


Illustration 97 g01300491

1. Wipe off the fittings before any lubricant is applied.
2. Apply lubricant through the two fittings until grease is visible around the bearings.
3. Check that grease is visible around the bearings in order to ensure the proper fill.

i04488529

Backup Alarm - Test

SMCS Code: 7406-081

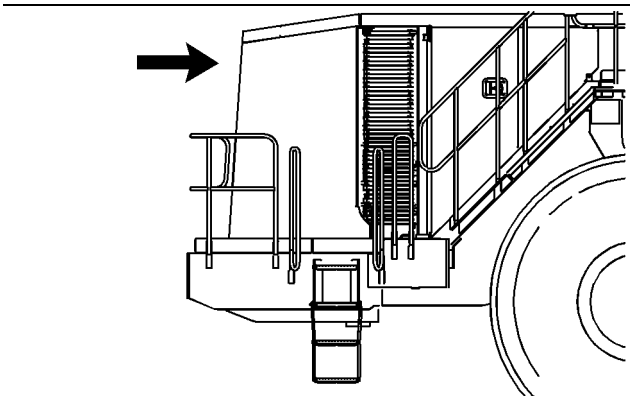


Illustration 98 g02586397

The backup alarms are located behind the fan guard on the rear of the machine.

1. Turn the engine start switch key to the ON position in order to perform the test.
2. Apply the service brake.
3. Move the transmission direction control switch to the REVERSE position.

The backup alarms should immediately sound. The backup alarms will continue to sound until the transmission direction control switch is moved to the NEUTRAL position or to the FORWARD position.

i02533066

Battery - Clean

SMCS Code: 1401-070

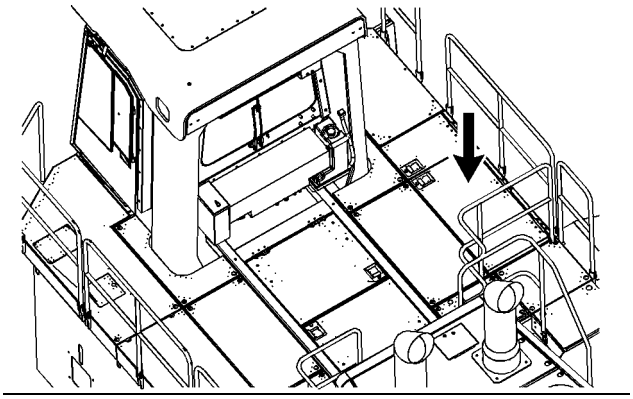


Illustration 99 g01267281

Open the battery compartment on the right rear corner of the cab platform.

Clean the battery terminals and the surfaces of the batteries with a clean cloth. Coat the battery terminals with petroleum jelly. Make sure that the battery cables are installed securely.

i00993589

Battery - Recycle

SMCS Code: 1401-561

Always recycle a battery. Never discard a battery.

Always return used batteries to one of the following locations:

- A battery supplier
- An authorized battery collection facility
- Recycling facility

i02533077

Battery Hold-Down - Tighten

SMCS Code: 7257-527

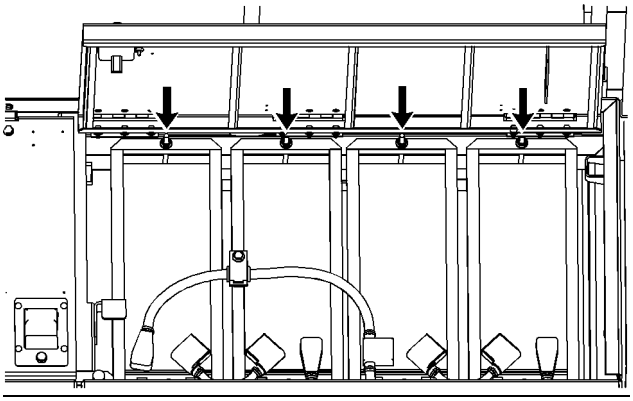


Illustration 100 g01267286

Open the battery compartment on the right rear corner of the cab platform.

Over time, the vibration of an operating machine can cause the battery hold-downs to loosen. To help to prevent loose batteries and the possibility of loose cable connections, tighten the eight locknuts (two per battery) to a torque of 14 ± 2 N·m (10 ± 1.5 lb ft).

i01835250

Battery or Battery Cable - Inspect/Replace

SMCS Code: 1401-040; 1401-510; 1402-040; 1402-510

1. Turn the engine start switch key to the OFF position. Turn all of the switches to the OFF position.
2. Turn the battery disconnect switch to the OFF position. Remove the key.
3. Disconnect the positive battery cable at the battery disconnect switch. The battery disconnect switch is connected to the machine frame.

Note: Do not allow the disconnected battery cable to contact the disconnect switch.

4. Disconnect the negative battery cable at the battery that is connected to the battery disconnect switch. If the machine has four 12 volt batteries, disconnect the negative battery cables of two of the batteries.
5. Make any necessary repairs or replace the battery.
6. Reconnect the negative battery cable at the battery that is connected to the battery disconnect switch.
7. Reconnect the positive battery cable at the battery disconnect switch.
8. Install the key and turn the battery disconnect switch to the ON position.

i04170030

Belt - Inspect/Adjust/Replace

SMCS Code: 1397-025; 1397-040; 1397-510

Inspect

1. Park the machine on level ground. Lower the bucket to the ground. Move the transmission control switch to the NEUTRAL position and engage the parking brake. Shut off the engine.

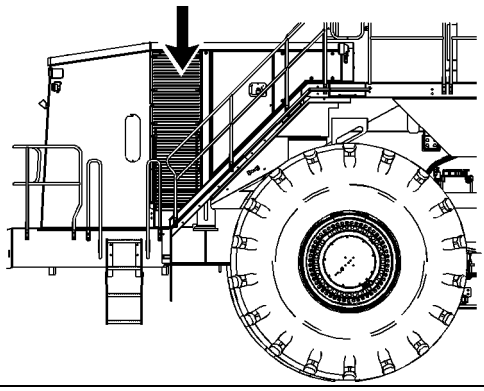


Illustration 101 g01254405

2. Open the grill assembly on the right side of the machine.

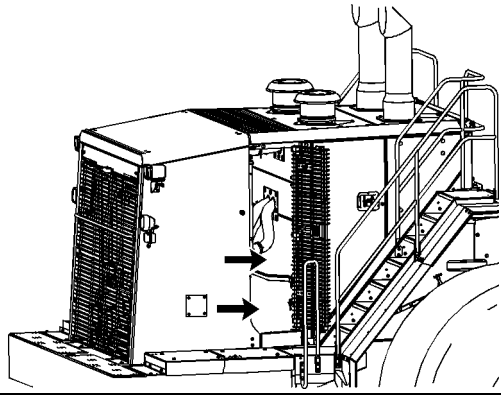


Illustration 102 g01278197

3. Remove the engine access covers in order to gain access to the belt.

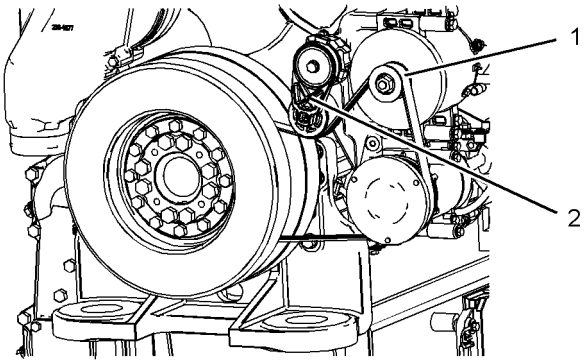


Illustration 103 g01233393

4. Inspect the condition of the serpentine belt (1). The belt deflection should not be more than 14 to 20 mm (0.55 to .81 inch) under 110 N (25 lb) of force. Use a 144-0235 Belt Tension Gauge in order to measure the tension.

Note: If a new belt is installed, recheck the belt adjustment after 30 minutes of operation.

Note: This machine is equipped with a belt tensioner (2). The belt tensioner automatically adjusts the belt to the correct position.

5. Install the engine access covers.

6. Close the grill assembly.

Replace

1. Replace the belt if any of the following conditions exist:

   - Excessive cracking
   - Excessive wear
   - Excessive damage

2. Park the machine on level ground. Lower the bucket to the ground. Move the transmission control switch to the NEUTRAL position and engage the parking brake. Shut off the engine.

3. The battery disconnect switch is located on the control panel on the left side of the rear bumper. Turn the battery disconnect switch to the OFF position.

4. Open the grill assembly on the right side of the machine.

5. Remove the engine access covers in order to gain access to the belt.

6. Release the tension on the serpentine belt (1). Insert a ratchet into the square hole in the belt tensioner and rotate the belt tensioner in a clockwise direction.

7. Remove the belt.

8. Install a new belt.

9. When you release the tension off the belt tensioner, the belt will automatically adjust to the correct position. Recheck the belt tension.

10. Turn the battery disconnect switch to the ON position.

11. Install the engine access covers.

12. Close the grill assembly.

i04402685

Brake Accumulator - Check

SMCS Code: 4263-535

WARNING

Hydraulic accumulator contains gas and oil under high pressure. Improper removal or repair procedures could cause severe injury. To remove or repair, instructions in the service manual must be followed. Special equipment is required for testing and charging.

1. Park the machine on level ground and lower the bucket. Ensure that the area is clear of obstacles and personnel. Block the wheels in order to prevent machine motion.

2. Move the engine start switch to the ON position.

3. Start the engine and run the engine for 1 minute in order to increase the accumulator pressure. The alert indicator for the brake oil pressure should come on if the brake system is not at the normal operating pressure. Release the parking brake. Stop the engine.

4. Move the engine start switch to the ON position. Allow the monitoring system to completely cycle through the self test. Depress the service brake pedal until the parking brake indicator comes on. This will decrease the accumulator pressure. A minimum of five applications should be required.

5. If the parking brake indicator comes on with less than five applications of the service brake pedal, measure the nitrogen precharge pressure of the accumulator.

Your Cat dealer has the appropriate tools for measuring the precharge pressure of the brake accumulator. Only use dry nitrogen gas for recharging.

i02060586

Braking System - Test

SMCS Code: 4251-081; 4267-081

1. Fasten the seat belt.
2. Make sure that the steering frame lock is in the unlocked position.
3. Park the machine on a hard, dry, level surface.
4. Check the area around the machine. Make sure that the machine is clear of personnel and clear of obstacles.

The following tests are used to determine whether the braking system is functional. These tests are not intended to measure the maximum brake holding effort. The required brake holding effort for sustaining a machine at a specific engine rpm varies from one machine to another machine. The variations include differences in the engine setting, the power train efficiency, the brake holding ability, etc.

Service Brake Holding Ability Test

⚠ WARNING

Personal injury can result if the machine moves while testing.

If the machine begins to move during test, reduce the engine speed immediately and engage the parking brake.

This test is performed when the service brakes are engaged. If the machine begins to move, compare the engine rpm to the engine rpm of a prior test. This will indicate the amount of system deterioration.

1. Start the engine. Raise the work tool slightly. Apply the service brake. Release the parking brake.
2. Move the hydraulic lockout control to the UNLOCKED position.
3. Place the transmission in THIRD SPEED FORWARD while the service brakes are applied.
4. Gradually increase the engine speed to high idle. The machine should not move.
5. Reduce the engine speed to low idle. Place the transmission in neutral. Engage the parking brake. Lower the work tool to the ground. Stop the engine.

If the machine moved during the test, consult your Caterpillar dealer for a brake inspection. Make any necessary repairs before the machine is returned to operation.

Parking Brake Holding Ability Test

⚠ WARNING

Personal injury can result if the machine moves while testing.

If the machine begins to move, reduce the engine speed immediately and apply the service brake pedal.

This test is performed when the parking brake is engaged. If the machine begins to move, compare the engine rpm to the engine rpm of a prior test. This will indicate the amount of system deterioration.

1. Start the engine. Raise the work tool slightly. Engage the parking brake.
2. Move the hydraulic lockout control to the UNLOCKED position.
3. Place the transmission in THIRD SPEED FORWARD while only the parking brake is engaged.

   The parking brake indicator light should come on.
4. Gradually increase the engine speed to high idle. The machine should not move.
5. Reduce the engine speed. Place the transmission in neutral. Lower the work tool to the ground. Stop the engine.

If the machine moved during the test, consult your Caterpillar dealer for a brake inspection. Make any necessary repairs before the machine is returned to operation.

i02453840

Bucket Cutting Edges - Inspect/Replace

SMCS Code: 6801-040; 6801-510

⚠ WARNING

Personal injury or death can result, if the bucket is not blocked up. Block the bucket before changing cutting edge.

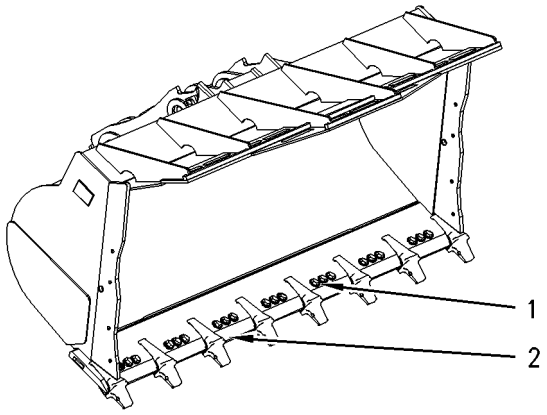


Illustration 104 g00804790

Check for bolts that are missing or loose. Replace any missing bolts and tighten any loose bolts.

Reference: For more information, refer to Specifications, SENR3130, “Torque Specifications” or consult your Caterpillar dealer.

Inspect the cutting edges and the end bits. If wear or damage is evident, use the following procedure to replace the components.

1. Raise the bucket and place blocking under the bucket. Lower the bucket onto the blocking.

Note: Do not block up the bucket too high. Block up the bucket enough for removing the cutting edges and the end bits.

2. Remove bolts (1). Remove cutting edges (2) and the end bits.

3. Clean the contact surfaces. Inspect the cutting edges and install the cutting edges.

   If the opposite side of the cutting edge is not worn, use that side. If both sides of the cutting edge are worn, install a new cutting edge.

4. Install bolts (1). Tighten the bolts to the specified torque.

5. Raise the bucket and remove the blocking. Lower the bucket to the ground.

6. After a few hours of operation, check the bolts for proper torque.

i02919686

Bucket Linkage and Loader Cylinder Bearings - Lubricate

SMCS Code: 5102-086-BD; 5104-086-BD; 6107-086-BD

Note: This procedure is for machines that are not equipped with the automatic lubrication system.

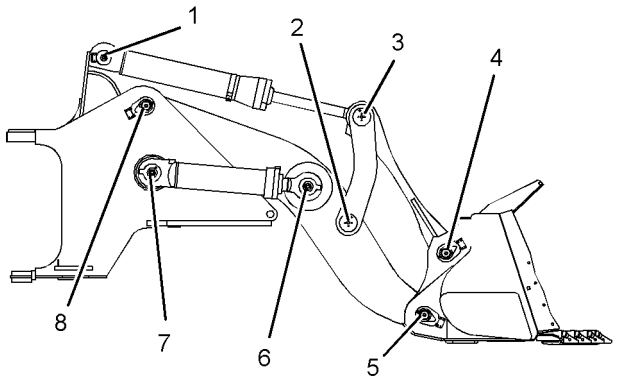


Illustration 105 g01451266

Typical example

1. Wipe off the fittings before any lubricant is applied.

2. Apply lubricant to pins (1), (2), (3), and (4) through the grease fittings.

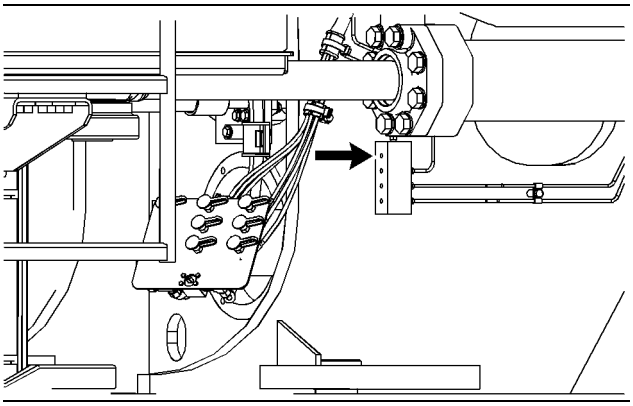


Illustration 106 g01451493

In order to lubricate pin (1), apply grease through the remote fitting that is located on the right side of the machine near the articulation joint.

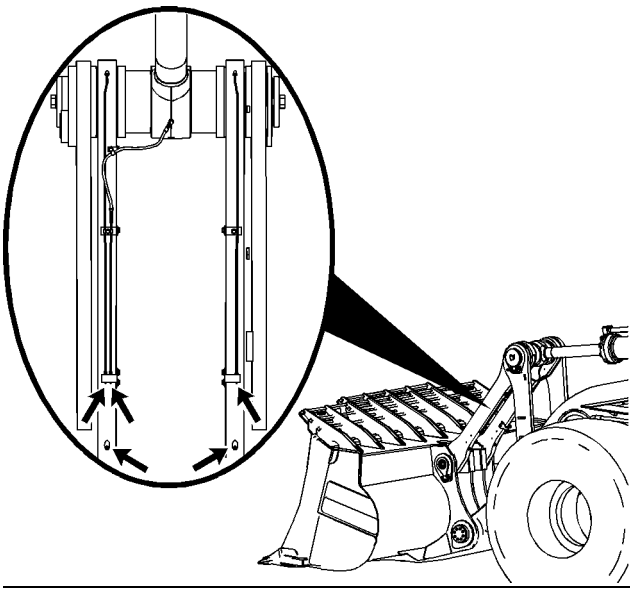


Illustration 107 g01451494

In order to lubricate pins (3) and (4), apply grease through the fittings that are located on the underside of the bucket links.

Note: Pins (5), (6), (7), and (8) do not require grease. Consult your Caterpillar dealer, if these pins experience excessive leaking, noise, or excessive temperatures, for further information.

i03247197

Bucket Stops - Inspect

SMCS Code: 6107-040-SQ

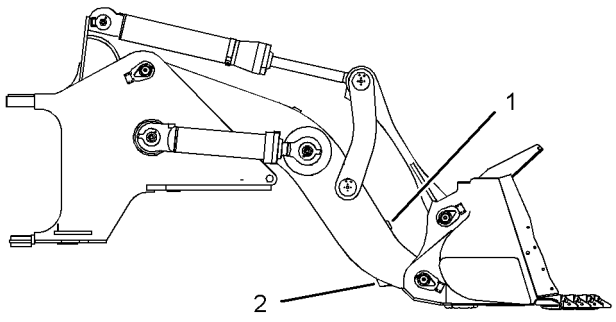


Illustration 108 g01449696

Note: Do not use additional hydraulic force in order to make contact with the bucket stops. Take all measurements at the time of initial contact in order to prevent twisting.

1. Tilt back the bucket completely. Check for uneven contact between the bucket and rack stops (1).

Note: Cracking can occur on the boom or on the bucket if dump stop (2) on the bottom of the boom does not fully contact the dump stop on the bottom of the bucket. Use the following steps to identify this problem.

2. Clean dump stop (2) and the dump stop on the bucket.

3. Apply a light coat of grease to the dump stop (2). The grease will help to determine the amount of contact that is being made when the dump stop (2) contacts the dump stop on the bucket.

4. Tilt the bucket so that dump stop (2) and the dump stop on the bucket contact each other. Partially tilt back the bucket in order to inspect the alignment.

5. Inspect the dump stops and determine the amount of contact. If even contact is being made across the dump stops, no further action is required.

Reference: If uneven contact exists, refer to Special Instruction, REHS0250, “Boom Repair and Bucket Stop Alignment” for instructions about repairing the bucket stops.

i02594942

Bucket Tips - Inspect/Replace

SMCS Code: 6805-040; 6805-510

⚠ WARNING

Personal injury or death can result from the bucket falling.

Block the bucket before changing bucket tips.

Note: In order to maximize the life of the bucket tip and the penetration of the bucket tip, the bucket tip can be rotated.

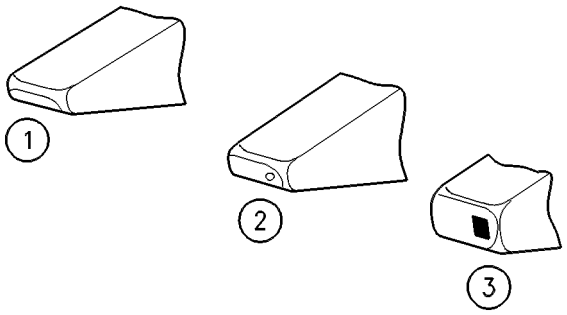


Illustration 109 g00101352

(1) Usable
(2) Removal Procedure
(3) Removal Procedure

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

Removal

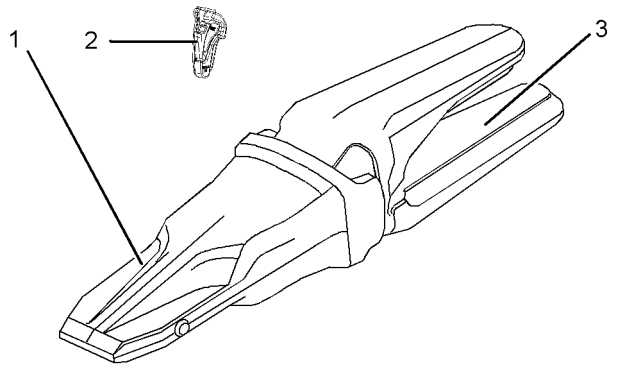


Illustration 110 g01124847

(1) Bucket tip
(2) Retainer
(3) Adapter

Note: Retainers are often damaged during the removal process. Caterpillar recommends the installation of a new retainer when bucket tips are rotated or replaced.

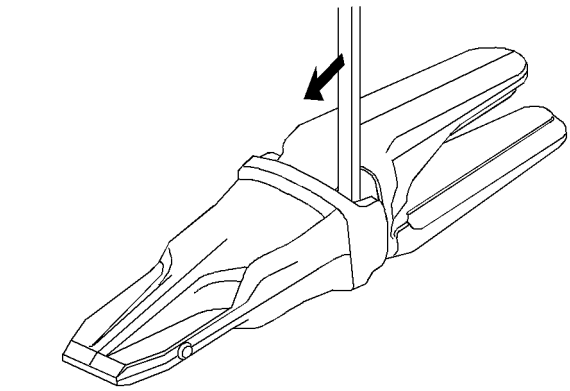


Illustration 111 g01175361

1. Use a pry bar in order to disengage retainer (2).
2. Use the pry bar in order to remove retainer (2) from bucket tip (1).
3. Remove bucket tip (1) from adapter (3) with a slight counterclockwise rotation.
4. Clean adapter (3).

Installation

1. Clean the adapter and the area around the latch, if necessary.
2. Install the new bucket tip onto the adapter with a slight clockwise rotation.

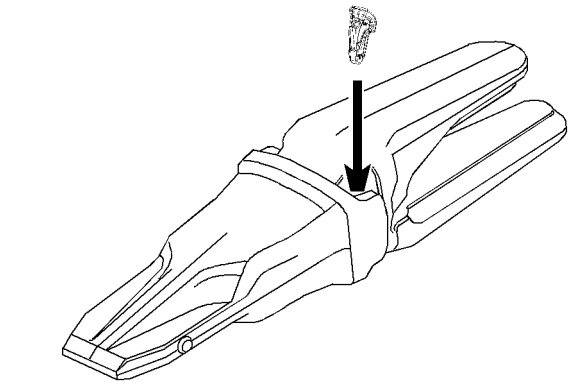


Illustration 112 g01124736

3. Install the retainer. Make sure that the retainer's latch catches under the tip pocket.
4. Make sure that the latch is properly seated by trying to remove the bucket tip.

i02453827

Bucket Wear Plates - Inspect/Replace

SMCS Code: 6120-040; 6120-510

⚠ WARNING

Personal injury or death can result from falling bucket.

When working under or around the bucket or linkage, with the bucket raised, proper support must be provided for the bucket and/or the linkage.

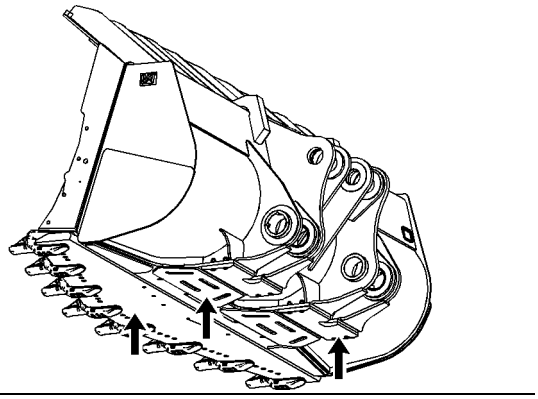


Illustration 113 g01289574

Before damage to the bottom of the bucket occurs, repair damaged bucket wear plates or replace damaged bucket wear plates.

1. Raise the bucket and block up the bucket.
2. Loosen bolts and remove wear plates.
3. Install new wear plates. Tighten the bolts to the specified torque.

   Reference: For more information, refer to Specifications, SENR3130, “Torque Specifications” or consult your Caterpillar dealer.

i03247220

Cab Air Filter - Clean/Replace

SMCS Code: 7342-070; 7342-510

Note: The filters must be cleaned more often if the machine is being operated in dusty conditions.

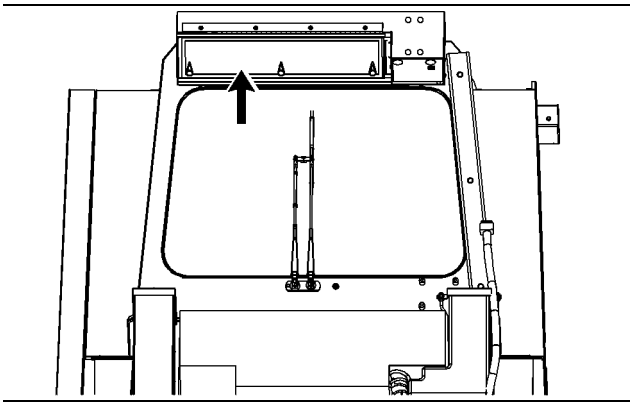


Illustration 114 g01267423

1. Lift the cover on the outside rear of the cab.

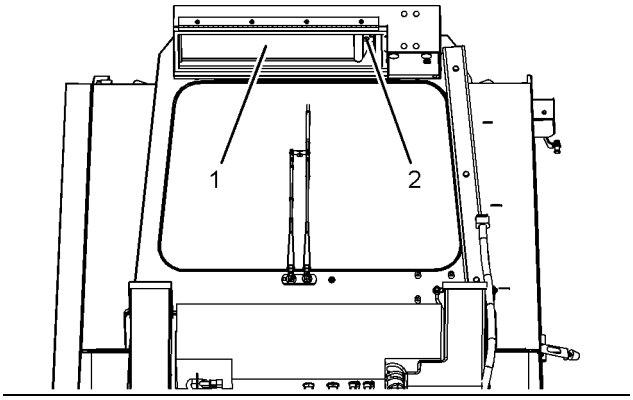


Illustration 115 g01267424

2. Remove retainer (2) from the cover. Remove fresh air filter (1).

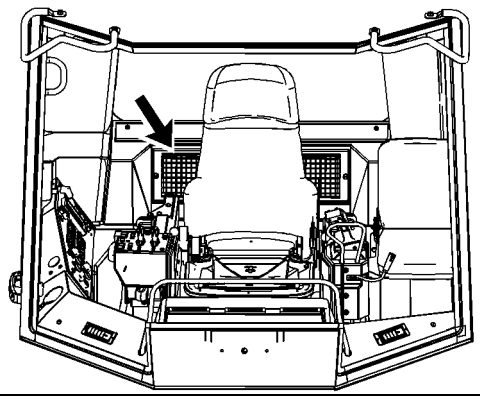


Illustration 116 g01267426

3. Remove the filter cover behind the seat. Remove the recirculation filter.
4. Clean the filter elements with pressure air or wash the filter elements in warm water with a nonsudsing household detergent.

5. If water was used to wash the filter elements, rinse the filter elements in clean water and allow the filter elements to air dry thoroughly.

6. Install the recirculation filter and the filter cover behind the seat.

7. Install fresh air filter (1) and retainer (2). Close the cover on the outside rear of the cab.

i02816405

Camera - Clean (If Equipped)

SMCS Code: 7348-070

In order to maintain sufficient vision, keep the Work Area Vision System (WAVS) camera lens and the display clean.

Display

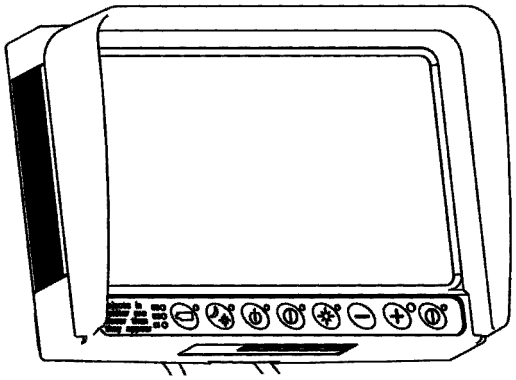


Illustration 117 g01223034

WAVS display

Use a soft, damp cloth in order to clean the display. The display has a soft plastic surface that can be easily damaged by an abrasive material. **The display is not sealed. Do not immerse the display with liquid.**

Camera

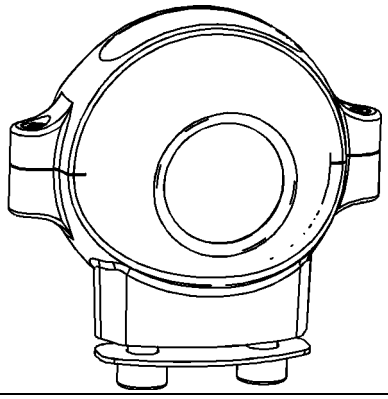


Illustration 118 g01223051

The WAVS camera is located on the rear of the machine in the center of the fan guard.

Use a damp cloth or water spray in order to clean the camera lens. The camera is a sealed unit. The camera is not affected by high pressure spray.

The camera is equipped with an internal heater to help counteract the effects of condensation, snow, or ice.

Note: For more information on WAVS, refer to Operation and Maintenance Manual, SEBU8157, “Work Area Vision System”.

i04290956

Case Drain Oil Filters - Replace

SMCS Code: 5091-510

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

Replace the case drain filters when a failure occurs within the hydraulic system.

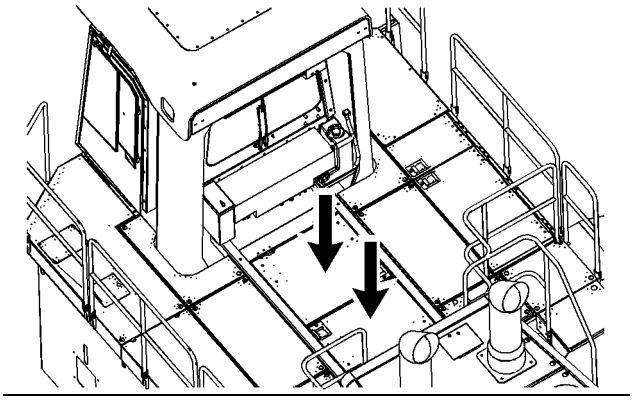


Illustration 119 g01449523

Three case drain filters are located under the access doors in the cab platform.

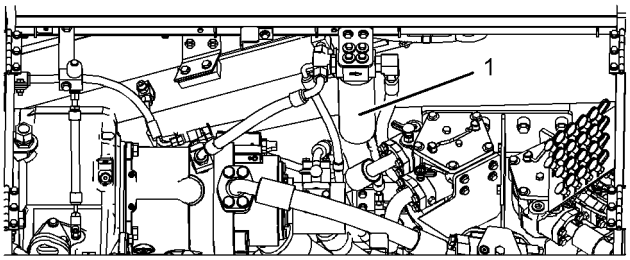


Illustration 120 g01449520

Left Side of Compartment

(1) Case Drain Filter (Steering)

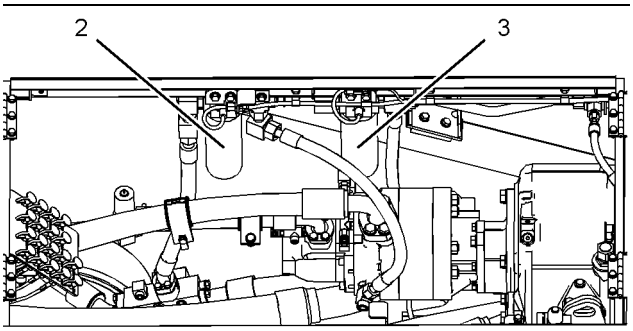


Illustration 121 g01449521

Right Side of Compartment

(2) Case Drain Filter (Implement)
(3) Case Drain Filter (Fan)

1. Stop the engine.
2. Use a strap type wrench to remove the filter. Dispose of the used filter properly.
3. Clean the filter mounting base. Make sure that all of the used gasket is removed from the filter mounting base.
4. Lubricate the gasket of the new filter with clean hydraulic oil.
5. Install the new filter by hand. When the gasket contacts the filter base, tighten the filter by an additional 3/4 turn.
6. Repeat the above steps for the remaining case drain filters. There are a total of three case drain filters.
7. Start the engine and run the engine at low idle. Operate the steering, the brakes, and the implements.
8. Stop the engine. Inspect the filters for leaks. Make any necessary repairs. Close all access doors.

i02534101

Circuit Breakers - Reset

SMCS Code: 1420-529

Circuit Breaker – Depress the button in order to reset the circuit breaker. If the system is functioning properly, the button will remain depressed. If the button does not stay depressed, check the appropriate electrical circuit.

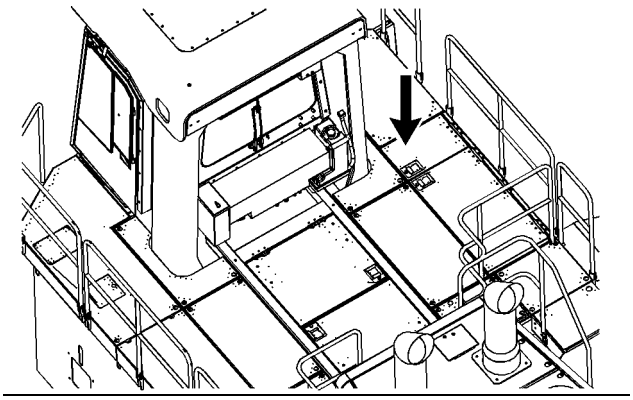


Illustration 122 g01267032

The circuit breakers are located under the access door on the right side of the cab platform.

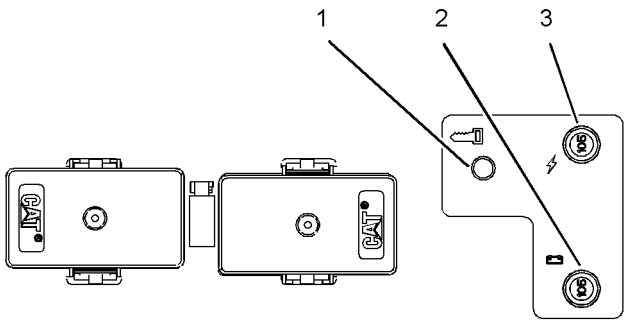


Illustration 123 g01267584

Engine Start Switch (1) – 10 amp

Alternator (2) – 105 amp

Main Circuit (3) – 105 amp

i02544211

Cooling System Coolant (ELC) - Change

SMCS Code: 1350-044-NL

⚠ WARNING

Pressurized system: Hot coolant can cause serious burn. To open cap, stop engine, wait until radiator is cool. Then loosen cap slowly to relieve the pressure.

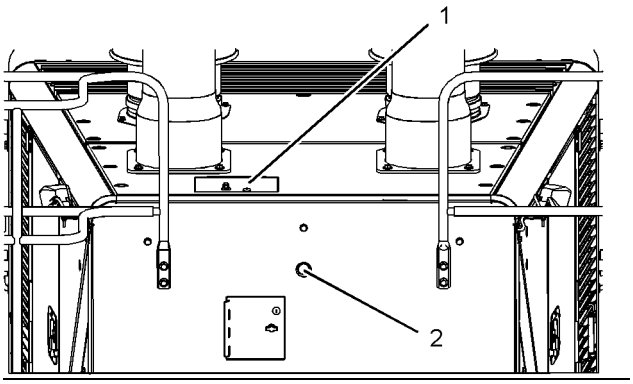


Illustration 124 g01273221

1. Open the small access door (1) on the top of the engine compartment. Slowly remove cooling system pressure cap in order to relieve system pressure.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

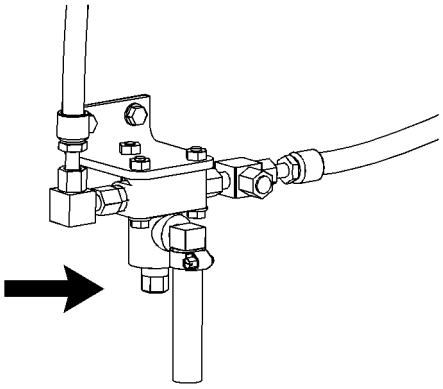


Illustration 125 g01273210

2. The coolant drain valve is located under the rear of the machine. Open the drain valves. Allow the coolant to drain into a suitable container.

3. Flush the cooling system with clean water until the draining water is clean. Close the drain valves.

4. Replace the water temperature regulator.

   Reference: Refer to Operation and Maintenance Manual, “Cooling System Water Temperature Regulator - Replace” for the correct procedure.

NOTICE
Topping off or mixing Cat ELC with other products that do not meet Caterpillar EC-1 specifications reduces the effectiveness of the coolant and shortens coolant service life.

Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specification for pre-mixed or concentrate coolants. Use only Extender with Cat ELC.

Failure to follow these recommendations can result in shortened cooling system component life.

5. Add 268 L (71 US gal) of Extended Life Coolant (ELC).

6. Start the engine. Run the engine without the cooling system pressure cap until the thermostat opens and the coolant level stabilizes.

7. Observe sight gauge (2) in order to maintain the coolant levels.

8. Install the cooling system pressure cap. Close the access door.

Fast Fill

If your machine is equipped with a service center, you may drain the coolant through the fast fill port or you may add the coolant through a fast fill port.

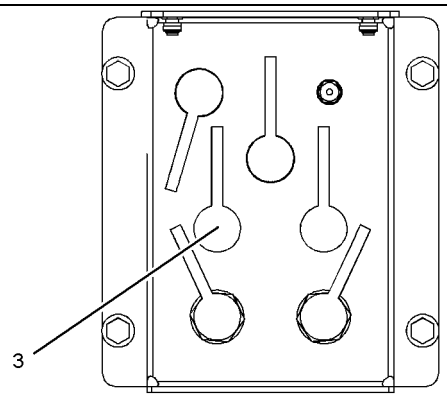


Illustration 126 g01338918

1. Remove the dust cover (3).

2. Attach the hose to the male coupling. Use a 127-9087 Nozzle for this port.

3. Drain the coolant or add the coolant, as needed.

Reference: For more information, refer to Operation and Maintenance Manual, “Service Center”.

i02540933

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352-544-NL

When a Caterpillar Extended Life Coolant (ELC) is used, an Extender must be added to the cooling system.

⚠ WARNING

Pressurized system: Hot coolant can cause serious burn. To open cap, stop engine, wait until radiator is cool. Then loosen cap slowly to relieve the pressure.

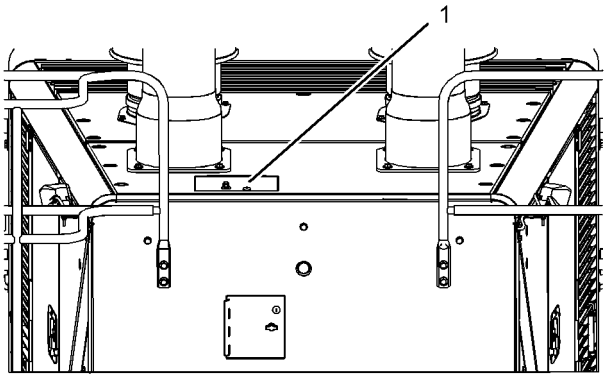


Illustration 127 g01272269

1. The cooling system pressure cap is located inside the access door (1) on top of the engine compartment. Slowly remove the cooling system pressure cap.

2. Use a coolant test kit in order to check the concentration of the coolant.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

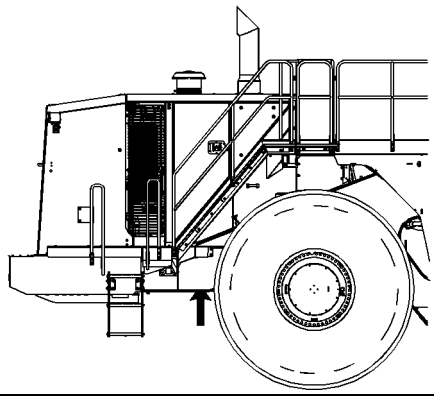


Illustration 128 g01272333

3. If necessary, drain enough coolant from the radiator in order to allow the addition of the Extender to the cooling system. The coolant drain valve is located under the rear of the machine.

NOTICE
Topping off or mixing Cat ELC with other products that do not meet Caterpillar EC-1 specifications reduces the effectiveness of the coolant and shortens coolant service life.

Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specification for pre-mixed or concentrate coolants. Use only Extender with Cat ELC.

Failure to follow these recommendations can result in shortened cooling system component life.

4. Add the Extender to the cooling system.

   Reference: For the correct amount, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” or consult your Caterpillar dealer.

5. Observe the sight gauge in order to maintain the coolant level within the sight gauge.

6. Install the cooling system pressure cap and close the access door.

i02540722

Cooling System Coolant Level - Check

SMCS Code: 1350-535-FLV

⚠ WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove filler cap slowly to relieve pressure only when engine is stopped and radiator cap is cool enough to touch with your bare hand.

Do not attempt to tighten hose connections when the coolant is hot, the hose can come off causing burns.

Cooling System Conditioner contains alkali. Avoid contact with skin and eyes.

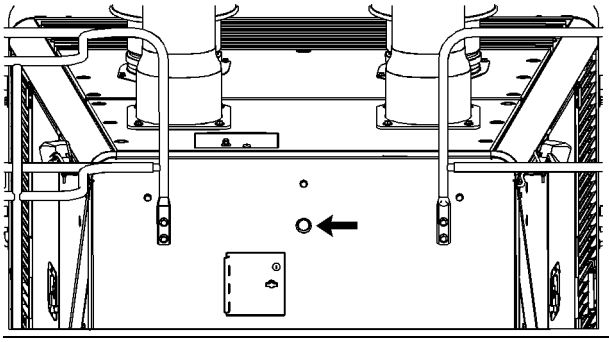


Illustration 129 g01272283

1. Observe the sight gauge in order to maintain the coolant level within the sight gauge.

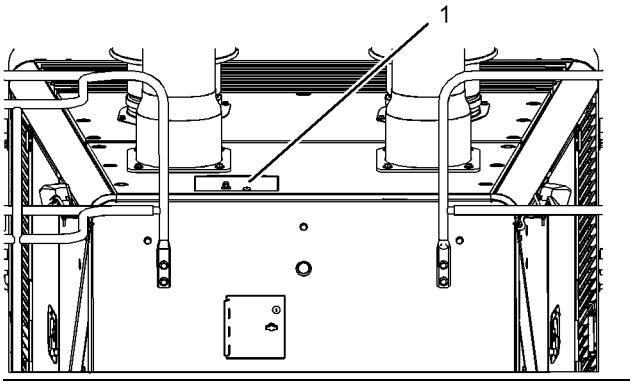


Illustration 130 g01272269

2. If additional coolant is necessary, remove the cooling system pressure cap that is located inside the access door (1) on top of the engine compartment.

3. Add the appropriate amount of coolant and install the filler cap.

i02534322

Cooling System Coolant Sample (Level 1) - Obtain

SMCS Code: 1350-008; 1395-008; 7542

NOTICE
Always use a designated pump for oil sampling, and use a separate designated pump for coolant sampling. Using the same pump for both types of samples may contaminate the samples that are being drawn. This contaminate may cause a false analysis and an incorrect interpretation that could lead to concerns by both dealers and customers.

Note: It is not necessary to obtain a Coolant Sample (Level 1) if the cooling system is filled with Cat ELC (Extended Life Coolant). Cooling systems that are filled with Cat ELC should have a Coolant Sample (Level 2) that is obtained at the recommended interval that is stated in the Maintenance Interval Schedule.

Note: Obtain a Coolant Sample (Level 1) if the cooling system is filled with any other coolant instead of Cat ELC. This includes the following types of coolants.

- Commercial long life coolants that meet the Caterpillar Engine Coolant Specification -1 (Caterpillar EC-1)
- Cat Diesel Engine Antifreeze/Coolant (DEAC)
- Commercial heavy-duty coolant

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Note: Level 1 results may indicate a need for Level 2 Analysis.

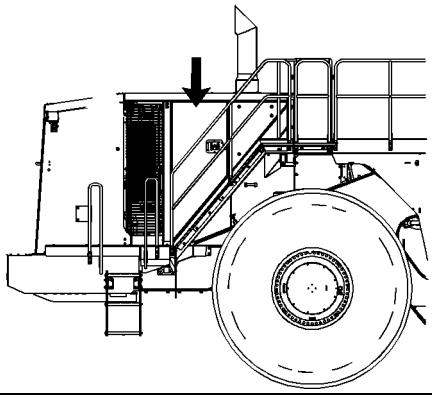


Illustration 131 g01267734

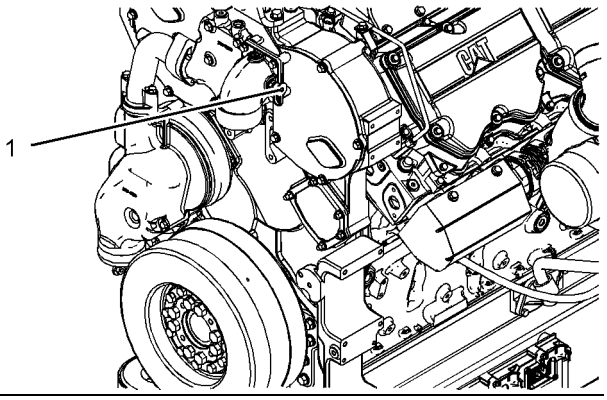


Illustration 132 g01267735

The sampling port (1) is located on the thermostat housing. Use the engine access door on the right side of the machine in order to gain access to the port.

For additional information about coolant analysis, see Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” or consult your Caterpillar dealer.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. In order to receive the full effect of S·O·S analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent samplings that are evenly spaced. Supplies for collecting samples can be obtained from your Caterpillar dealer.

Submit the sample for Level 1 Analysis.

i02049802

Cooling System Coolant Sample (Level 2) - Obtain

SMCS Code: 1350-008; 1395-008; 7542

Reference: Refer to Operation and Maintenance Manual, “Cooling System Coolant Sample (Level 1) - Obtain” for the guidelines for proper sampling of the coolant.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. Supplies for collecting samples can be obtained from your Caterpillar dealer.

Submit the sample for Level 2 analysis.

Reference: For additional information about coolant analysis, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” or consult your Caterpillar dealer.

i03247291

Cooling System Water Temperature Regulator - Replace

SMCS Code: 1355-510; 1393-010

Replace the thermostat on a regular basis in order to reduce the chance of unscheduled downtime and of problems with the cooling system.

A new thermostat should be installed after the cooling system has been cleaned. Install the thermostat while the cooling system is completely drained or while the cooling system coolant is drained to a level that is below the thermostat housing.

NOTICE
Failure to replace the engine's thermostat on a regularly scheduled basis could cause severe engine damage.

Note: If you are only installing a new thermostat, drain the cooling system coolant to a level that is below the thermostat housing.

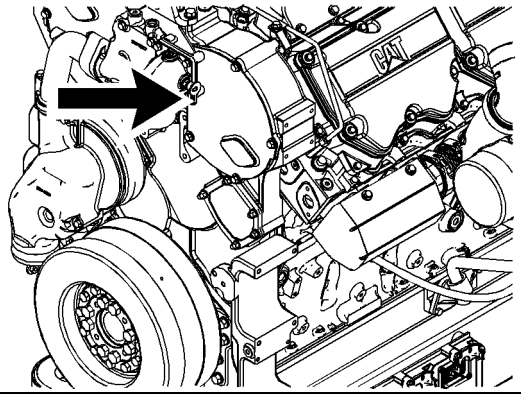


Illustration 133 g01459869

1. Remove all hoses from the thermostat.
2. Remove the bolts from the thermostat housing.
3. Remove the gasket, the thermostat, and the seal.

NOTICE
A used thermostat can be installed if the thermostat conforms to test specifications, and the thermostat is not damaged. Do not install a used thermostat that has excessive buildup or deposits.

NOTICE
Since Caterpillar engines incorporate a shunt design cooling system, it is mandatory to always operate the engine with a thermostat.

Depending on load, failure to operate with a thermostat could result in either an overheating or an overcooling condition.

NOTICE
If the thermostat is installed incorrectly, it will cause the engine to overheat.

4. Install a new seal in the thermostat housing. Install a new thermostat and a new gasket.
5. Install the hoses.
6. Add extended life coolant until the coolant level is visible in the sight gauge.

i02517124

Crankshaft Vibration Damper - Inspect

SMCS Code: 1205-040

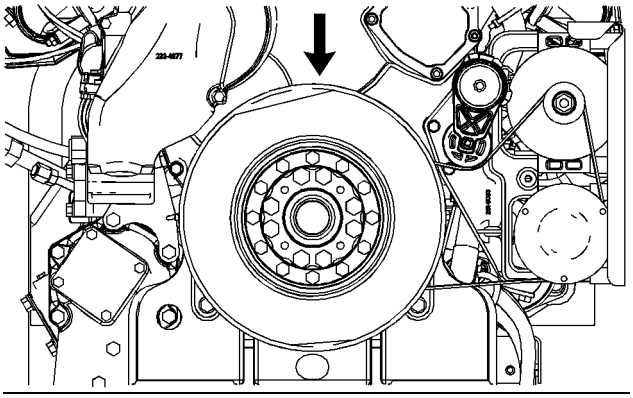


Illustration 134 g01259311

The crankshaft vibration damper is located at the rear end of the engine compartment.

Damage to the vibration damper or failure of the vibration damper will increase torsional vibrations. These vibrations will result in damage to the crankshaft and to the other engine components. A deteriorating vibration damper will cause excessive gear train noise at variable points in the speed range.

Caterpillar recommends replacing the vibration damper for any of the following reasons:

- The engine has had a failure because of a broken crankshaft.
- The S·O·S oil analysis detected a worn crankshaft front bearing.
- The S·O·S oil analysis detected a large amount of gear train wear that is not caused by a lack of oil.
- The alignment marks on the hub and on the outer ring are not in alignment because the rubber seal has separated.

The vibration damper can be used again if none of the above conditions are found and the damper is not damaged.

Note: Some wobble on the outer ring of the vibration damper is normal.

Consult your Caterpillar dealer for more information.

i03595170

Differential and Final Drive Oil - Change

SMCS Code: 3278-044; 4050-044

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Note: Perform this procedure on one axle at a time.

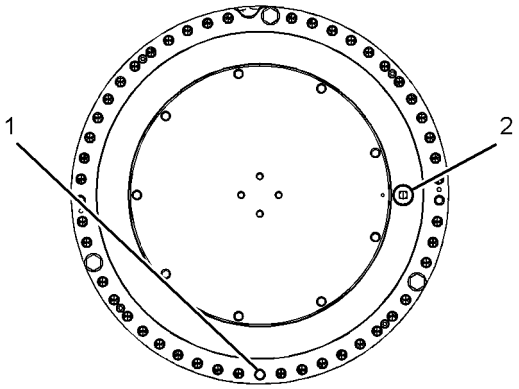


Illustration 135 g01449379

1. Position the wheels so that the final drive drain plug (1) is in the lowest position. This will ensure that the final drive filler plug (2) is in the correct position.
2. Push the button on the top of each axle breaker relief valve in order to relieve any pressure.

Note: Refer to Operation and Maintenance Manual, “Axle Breaker Relief Valve - Clean” for the axle breaker relief valve locations.

3. Remove the final drive plug (1) and allow the oil to drain into a suitable container.
4. Clean the drain plug and install the drain plug.
5. Repeat steps 2 through 4 for the other final drive.

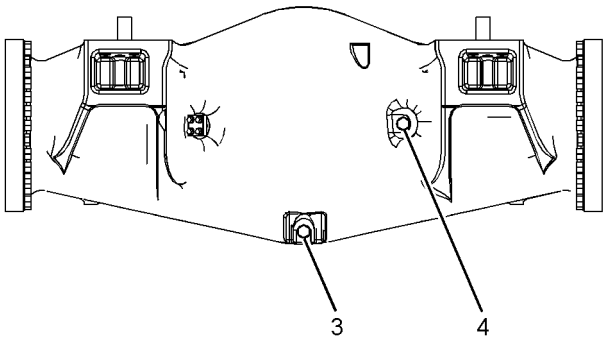


Illustration 136 g01449382

Front axle

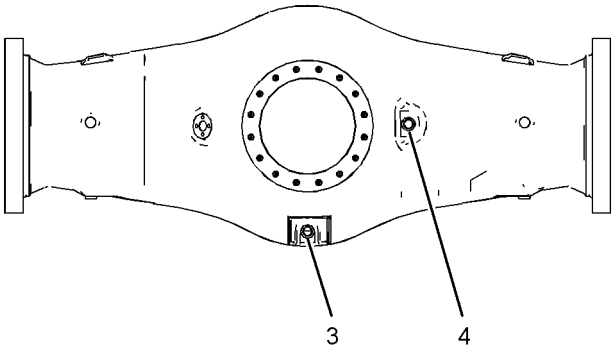


Illustration 137 g01449380

Rear axle

6. Remove the differential drain plug (3) and allow the oil to drain into a suitable container.

7. Clean the drain plug and install the drain plug.

8. Remove differential filler plug (4). .Fill the differential with SAE 50 oil until the oil level reaches the bottom of the filler plug opening.

9. Clean the filler plug and install the filler plug.

10. Remove the final drive filler plug (2). Fill the final drive with SAE 50 oil until the oil level reaches the bottom of the filler plug opening.

11. Clean the filler plug and install the filler plug.

12. Repeat steps 10 through 11 for the other final drive.

Note: Fill each axle with 4.7 L (5 qt) of 1U-9891 Additive.

Note: Refer to Operation and Maintenance Manual, “Lubricant Viscosities and Refill Capacities” for the refill capacity of each axle.

13. If the specified amount of oil will not fit in the final drives, install the final drive filler plugs. Operate the machine on level ground for a few minutes in order to equalize the oil level. Remove the final drive filler plugs and add the remaining oil.

14. Operate the machine for a few minutes and recheck the oil level. The oil level should reach the bottom of the filler plug opening.

    If the oil level is higher than the filler plug opening, do not allow the oil to drain to the proper level. Install the filler plug.

15. Repeat this procedure for the other differential and final drives.

i02912377

Differential and Final Drive Oil Level - Check

SMCS Code: 3278-535-FLV; 4050-535-FLV

Note: Perform this procedure on one axle at a time.

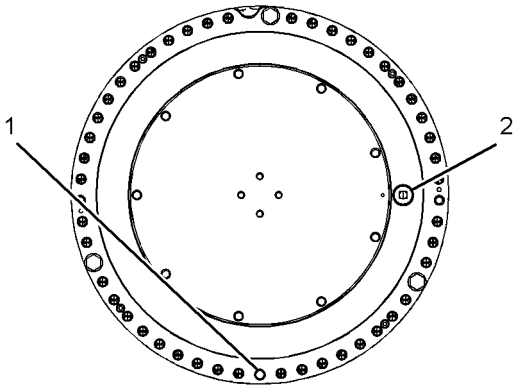


Illustration 138 g01449379

1. Position the wheels so that the final drive drain plug (1) is in the lowest position. This will ensure that the final drive filler plug (2) is in the correct position.

2. Push the button on the top of each axle breaker relief valve in order to relieve any pressure.

Note: Refer to Operation and Maintenance Manual, “Axle Breaker Relief Valve - Clean” for the axle breaker relief valve locations.

3. Remove the final drive filler plug. The oil level should be at the bottom of the filler plug opening. If necessary, add SAE 50 oil until the oil level reaches the bottom of the filler plug opening.

Note: If the oil level is higher than the filler plug opening, drain the oil to the proper level. Install the filler plug.

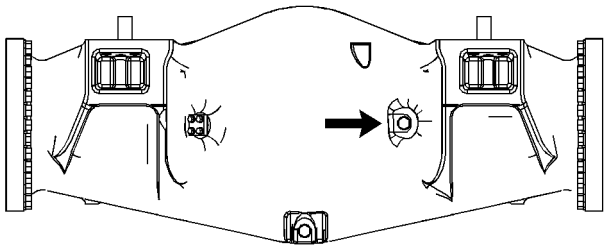


Illustration 139 g01449418

Front axle

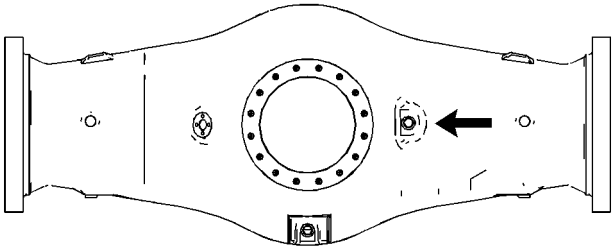


Illustration 140 g01449417

Rear axle

4. Remove the differential filler plug. The oil level should be at the bottom of the filler plug opening. If necessary, add SAE 50 oil until the oil level reaches the bottom of the filler plug opening.

Note: If the oil level is higher than the filler plug opening, drain the oil to the proper level. Install the filler plug.

5. Repeat the procedure for the other differential and final drives.

i02912423

Differential and Final Drive Oil Sample - Obtain

SMCS Code: 3278-008; 4050-008; 4070-008; 7542

NOTICE
Always use a designated pump for oil sampling, and use a separate designated pump for coolant sampling. Using the same pump for both types of samples may contaminate the samples that are being drawn. This contaminate may cause a false analysis and an incorrect interpretation that could lead to concerns by both dealers and customers.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Operate the machine for a few minutes before obtaining the oil sample. This will thoroughly mix the oil for a more accurate sample.

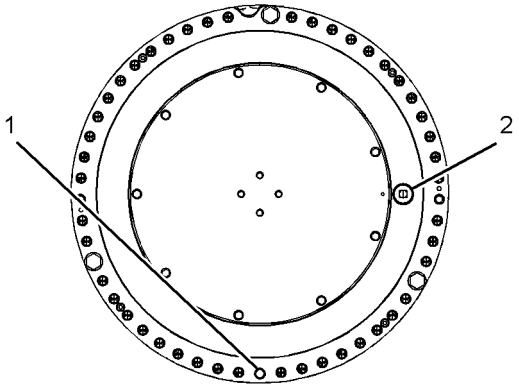
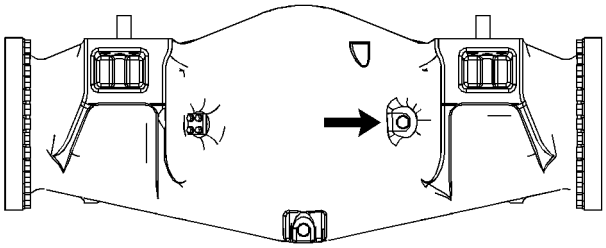


Illustration 141 g01449379

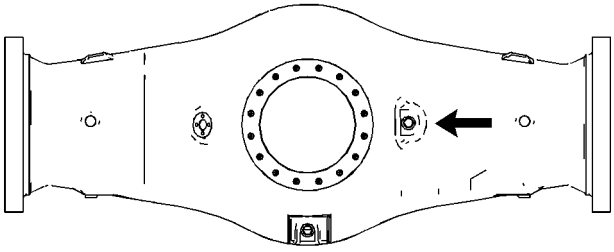
Final Drive Filler Plug



g01449418

Illustration 142

Front Differential Filler Plug



g01449417

Illustration 143

Rear Differential Filler Plug

2. The differential and final drives are not equipped with sampling valves. Obtaining an oil sample will require the use of a vacuum pump or equivalent in order to extract the oil from the component. Extract the oil through the filler openings on the differential and final drives.

Note: This procedure requires a sample for each final drive and each differential. There will be a total of three samples per axle and six samples for this procedure in total. Make sure that you properly record the location of each oil sample.

Reference: For more information, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” and Special Publication, PEHP6001, “How To Take A Good Oil Sample”.

i04407788

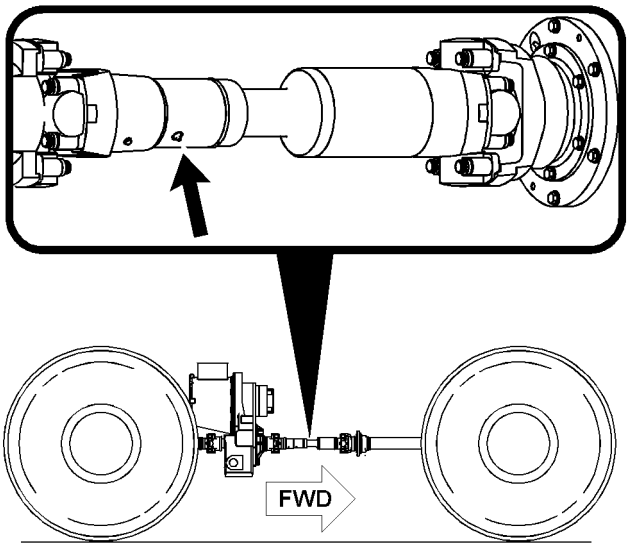
Drive Shaft Spline (Center) - Lubricate

SMCS Code: 3253-086-SN

NOTICE

To prevent damage to the seal, articulate the machine full right or left, before lubricating the splines.

1. Start the engine. Raise the work tool. Release the parking brake.
2. Articulate the machine to the left in order to access the drive shaft spline.
3. Lower the work tool to the ground. Stop the engine and engage the parking brake.



g02604197

Illustration 144

Note: Wipe the fitting before you apply any lubricant.

4. Apply lubricant through the fitting on the center drive shaft spline.

Note: Refer to this Operation and Maintenance Manual, “Lubricant Viscosities” for more information on the types of grease to use.

i04407849

Drive Shaft Support Bearing - Lubricate

SMCS Code: 3267-086-BD

The grease fitting can be accessed from the left side of the machine.

Note: If necessary, articulate the machine to the right for easier access to the drive shaft support bearing.

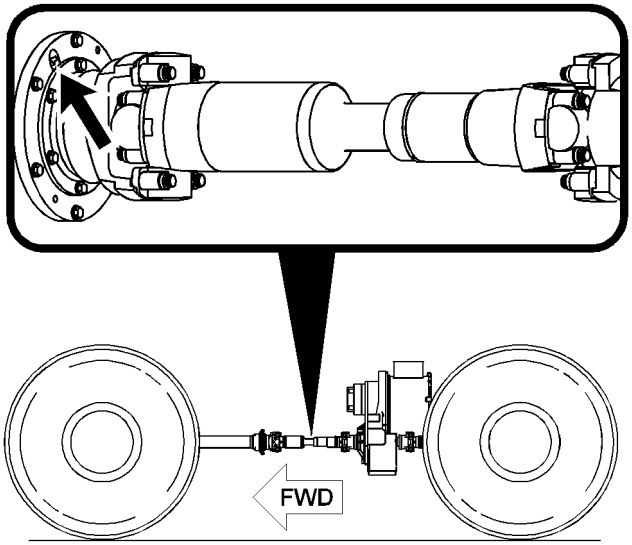


Illustration 145 g02604397

Note: Wipe the fitting before you apply any lubricant.

1. Apply lubricant through the fitting on the drive shaft support bearing.

Note: Refer to this Operation and Maintenance Manual, “Lubricant Viscosities” for more information on the types of grease to use.

i02061807

Electronic Unit Injector - Inspect/Adjust

SMCS Code: 1251-025; 1251-040; 1290-025; 1290-040

⚠ WARNING

The Electronic Control module produces high voltage. To prevent personal injury make sure the Electronic Control Module is not powered and the unit injector solenoids are disconnected.

NOTICE
The camshafts must be correctly timed with the crankshaft before an adjustment of the unit injector lash is made. The timing pins must be removed from the camshafts before the crankshaft is turned or damage to the cylinder block will be the result.

The operation of Caterpillar engines with improper adjustments of the electronic unit injector can reduce engine efficiency. This reduced efficiency could result in excessive fuel usage and/or shortened engine component life.

Adjust the electronic unit injector at the same interval as the valve lash adjustment.

Refer to your machine's Service Manual or your Caterpillar dealer for the complete adjustment procedure.

i02473339

Engine Air Filter Primary Element - Clean/Replace

SMCS Code: 1054-070-PY; 1054-510-PY

⚠ WARNING

Burn Hazard: Engine components may be hot during and after machine operation.

Hot components can cause serious personal injury. Do not contact hot components with bare skin.

⚠ WARNING

To avoid personal injury, always wear eye and face protection when using pressurized air.

NOTICE
Service the air filter only with the engine stopped. Engine damage could result.

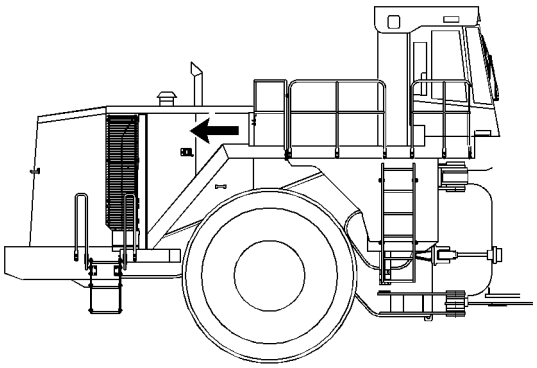


Illustration 146 g01266330

1. Open the rear access door on either side of the machine. An air filter element is located on both sides of the engine compartment.

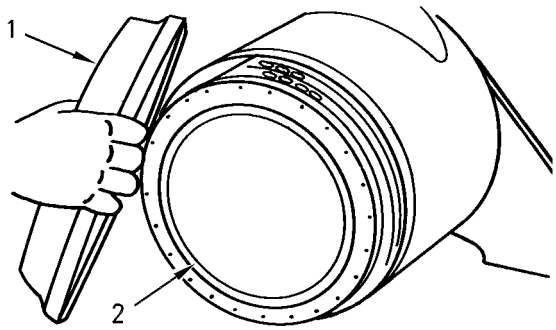


Illustration 147 g00281967

2. Loosen the cover latches and remove the air cleaner cover.

Note: The latches for the air cleaner housing may snap open when you release the latches.

3. Remove air filter element (2).

4. Clean the inside of the air filter housing.

5. Install a clean primary air filter element.

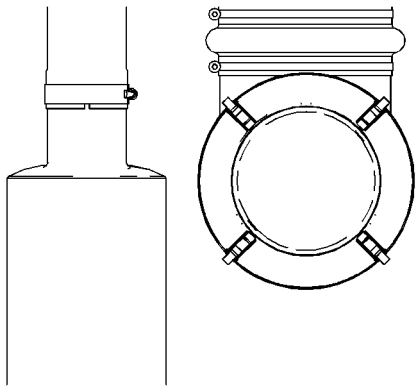


Illustration 148 g01430841

6. Install the air cleaner cover (1) and tighten the latches.

Note: Keep the latches for the air cleaner housing away from the muffler.

7. Close the access door.

8. Repeat this procedure for the air cleaner on the other side of the machine.

Cleaning the Primary Air Filter Element

NOTICE

Caterpillar recommends certified air filter cleaning services available at participating Caterpillar dealers. The Caterpillar cleaning process uses proven procedures to assure consistent quality and sufficient filter life.

Observe the following guidelines if you attempt to clean the filter element:

Do not tap or strike the filter element in order to remove dust.

Do not wash the filter element.

Use low pressure compressed air in order to remove the dust from the filter element. Air pressure must not exceed 207 kPa (30 psi). Direct the air flow up the pleats and down the pleats from the inside of the filter element. Take extreme care in order to avoid damage to the pleats.

Do not use air filters with damaged pleats, gaskets, or seals. Dirt entering the engine will cause damage to engine components.

The primary air filter element can be used up to six times after the element is properly cleaned. When the primary air filter element is cleaned, check for rips or tears in the filter material. The primary air filter element should be replaced at least one time per year. This replacement should be performed regardless of the number of cleanings.

NOTICE
Do not clean the air filter elements by bumping or tapping. This could damage the seals. Do not use elements with damaged pleats, gaskets, or seals. Damaged elements will allow dirt to pass through. Engine damage could result.

Visually inspect the primary air filter element before cleaning. Inspect the air filter element for damage to the seal, the gaskets, and the outer cover. Discard any damaged air filter elements.

There are two common methods that are used to clean the primary air filter element:

- Pressurized air
- Vacuum cleaning

Pressurized Air

Pressurized air can be used to clean a primary air filter element that has not been cleaned more than two times. Pressurized air will not remove deposits of carbon and oil. Use filtered, dry air with a maximum pressure of 207 kPa (30 psi).

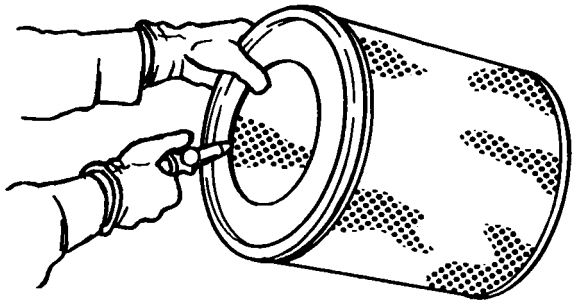


Illustration 149 g00281692

Note: When the primary air filter element is cleaned, always begin with the inside of the filter in order to force dirt particles toward the outside.

Aim the hose so that the air flows inside the element along the length of the filter in order to help prevent damage to the paper pleats. Do not aim the stream of air directly at the primary air filter element. Dirt could be forced further into the pleats.

Vacuum Cleaning

Vacuum cleaning is another method for cleaning a primary air filter element which requires daily cleaning because of a dry, dusty environment. Cleaning with pressurized air is recommended prior to vacuum cleaning. Vacuum cleaning will not remove deposits of carbon and oil.

Inspecting the Primary Air Filter Elements

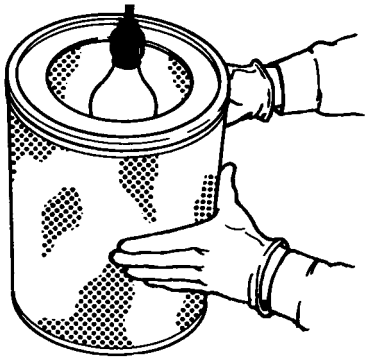


Illustration 150 g00281693

Inspect the clean, dry primary air filter element. Use a 60 watt blue light in a dark room or in a similar facility. Place the blue light in the primary air filter element. Rotate the primary air filter element. Inspect the primary air filter element for tears and/or holes. Inspect the primary air filter element for light that may show through the filter material. If it is necessary in order to confirm the result, compare the primary air filter element to a new primary air filter element that has the same part number.

Do not use a primary air filter element that has any tears and/or holes in the filter material. Do not use a primary air filter element with damaged pleats, gaskets or seals. Discard damaged primary air filter elements.

Storing Primary Air Filter Elements

If a primary air filter element that passes inspection will not be used, the primary air filter element can be stored for future use.

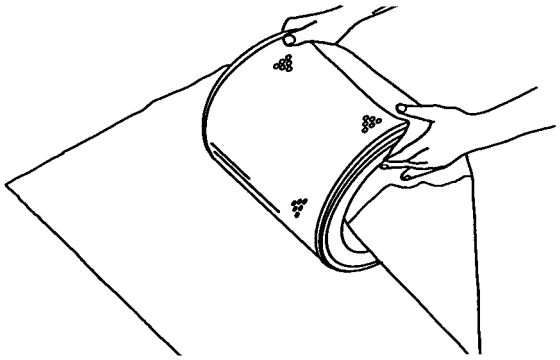


Illustration 151 g00281694

Do not use paint, a waterproof cover, or plastic as a protective covering for storage. An air flow restriction may result. To protect against dirt and damage, wrap the primary air filter elements in Volatile Corrosion Inhibited (VCI) paper.

Place the primary air filter element into a box for storage. For identification, mark the outside of the box and mark the primary air filter element. Include the following information:

- Date of cleaning
- Number of cleanings

Store the box in a dry location.

i01693619

Engine Air Filter Secondary Element - Replace

SMCS Code: 1054-510-SE

NOTICE
Service the air filter only with the engine stopped. Engine damage could result.

NOTICE
Always replace the secondary element. Do not attempt to reuse it by cleaning. Engine damage could result.

Note: Replace the secondary element when you service the primary element for the third time. If a clean primary element has been installed and a warning for the air filter still occurs, replace the secondary element. Also if the exhaust smoke remains black and a clean primary element has been installed, replace the secondary element.

1. Remove the primary element.

Reference: Refer to Operation and Maintenance Manual, “Engine Air Filter Primary Element - Clean/Replace” for the correct procedure.

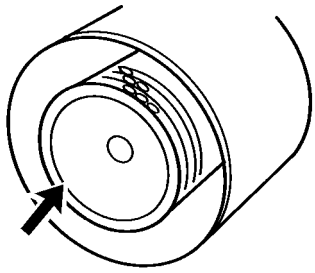


Illustration 152 g00864077

2. Remove the secondary element.

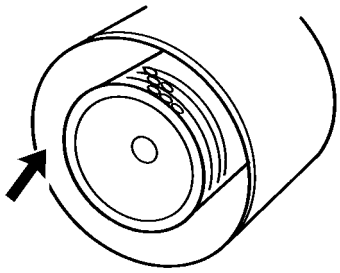


Illustration 153 g00864079

3. Cover the air inlet opening. Clean the inside of the air cleaner housing.
4. Inspect the gasket between the air inlet pipe and the air cleaner housing. Replace the gasket if the gasket is damaged.
5. Uncover the air inlet opening. Install a new secondary element.
6. Install a clean primary element and the cover for the air cleaner housing.
7. Close the access door.
8. Repeat the procedure for the other air cleaner.

i02550809

Engine Components - Rebuild/Install Reman

SMCS Code: 1000-022-MC

Caterpillar recommends this additional maintenance for the following components on C32 Engines. Consult your Caterpillar dealer for further information.

- Alternator
- Fuel Transfer Pump
- Injectors
- Turbochargers

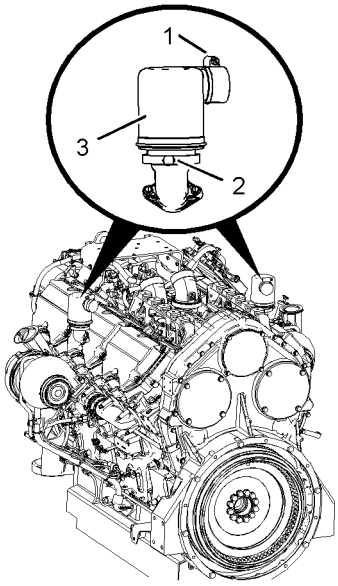
i04408833

Engine Crankcase Breather - Clean

SMCS Code: 1317-070

The engine crankcase breathers are located on each side of the engine. Perform this procedure for each breather.

1. Park the machine on level ground. Lower the bucket to the ground. Move the transmission control switch to the NEUTRAL position and engage the parking brake. Shut off the engine.
2. Open the engine access door on the side of the machine.



g01451213

Illustration 154

3. Loosen breather outlet hose clamp (1). Remove the hose from the breather cover.
4. Loosen breather inlet hose clamp (2) and remove breather (3).
5. Remove the cover from the breather.
6. Check the condition of the cover seal. If the seal is damaged, replace the seal.
7. Wash the breather element and the cover in clean, nonflammable solvent. Shake the element dry or use air pressure.
8. Inspect the hose for damage. If necessary, replace the hose.
9. Install the breather element in the cover.
10. Install breather (3). Tighten breather inlet hose clamp (2).
11. Install the outlet hose and tighten breather outlet hose clamp (1).
12. Close the engine access door.
13. Repeat steps 2 through 12 for the other breather.

i02164781

Engine Mounts - Inspect

SMCS Code: 1152-040

Caterpillar recommends checking the engine mounts for deterioration and for proper bolt torque. This will help to prevent excessive engine vibration that is caused by improper mounting.

i02534375

Engine Oil Level - Check

SMCS Code: 1000-535-FLV

NOTICE
Do not under fill or overfill engine crankcase with oil. Either condition can cause engine damage.

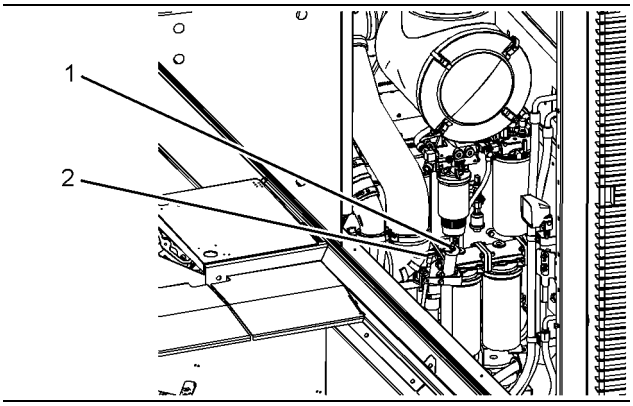


Illustration 155 g01267792

1. The engine oil level gauge (2) is located inside the engine access door on the left side of the machine. Open the access door.

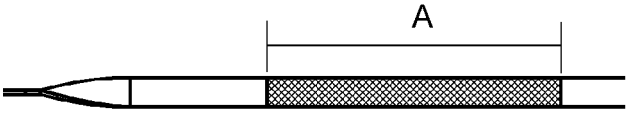


Illustration 156 g01239233

2. Check the engine oil level while the engine is stopped. Maintain the engine oil level in the shaded area (A) of the engine oil level gauge.

3. If necessary, add oil through the filler tube (1).

4. Close the access door.

i04409081

Engine Oil Sample - Obtain

SMCS Code: 1348-008; 7542

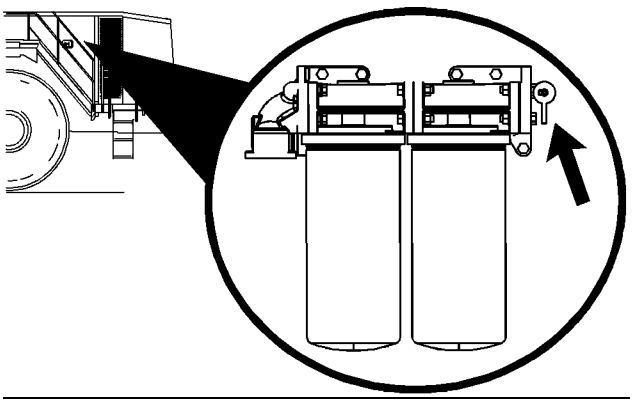


Illustration 157 g02606459

The sampling valve for the engine oil is located on the engine oil filter base on the left side of the machine.

Reference: Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information about obtaining a fluid sample.

i02534690

Engine Oil and Filter - Change

SMCS Code: 1318-510

⚠ WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Note: Be sure that you obtain a S·O·S engine oil sample before you drain the engine oil.

1. Park the machine on a level surface and engage the parking brake. Stop the engine.

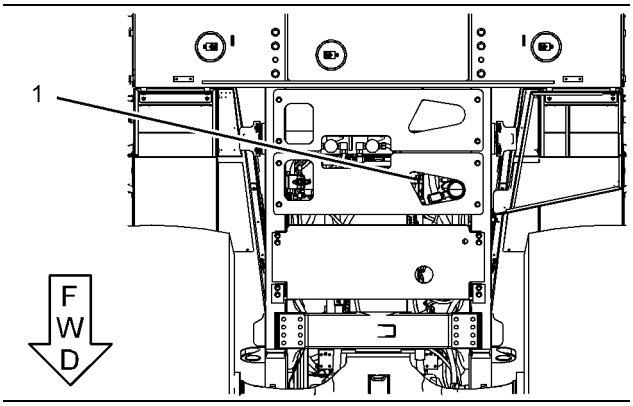


Illustration 158 g01267990

2. The drain valve (1) for the engine oil is located underneath the engine compartment toward the rear of the machine. Open the drain valve and allow the oil to drain into a suitable container.

3. Close the drain valve and clean the area around the drain valve.

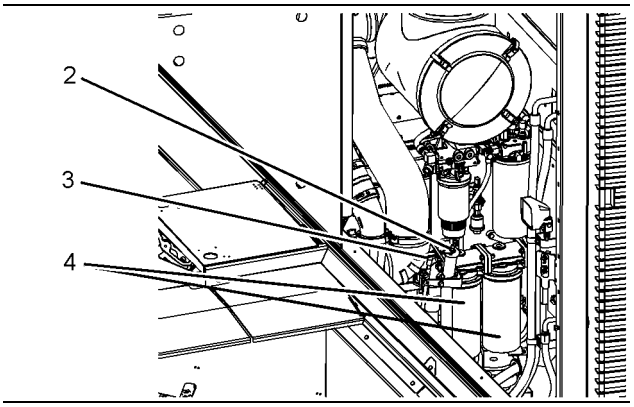


Illustration 159 g01267994

4. The engine oil filters (4) are located inside the access door on the left side of the engine compartment.

5. Remove the oil filter element and discard the filter properly. Make sure that the old seal is removed from the filter base.

6. Install a new filter.

a. Apply a thin coat of oil to the seal on the new filter.

b. Install the new engine oil filter hand tight until the seal of the engine oil filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the engine oil filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the engine oil filter, use the rotation index marks as a guide.

c. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide. For non-Caterpillar filters, use the instructions that are provided with the filter.

Note: You may want to use a Caterpillar strap wrench, or another suitable tool in order to turn the filter to the amount that is required for final installation. Make sure that the installation tool does not damage the filter.

7. Repeat steps 5 through 6.c for the other filter.

8. The oil filler cap (2) is located above the engine oil filters. Remove the filler cap.

9. Fill the engine crankcase with 126 L (33 US gal) of clean oil.

10. Clean the filler cap and install the filler cap.

11. Start the engine and allow the oil to warm. Check the engine for leaks.

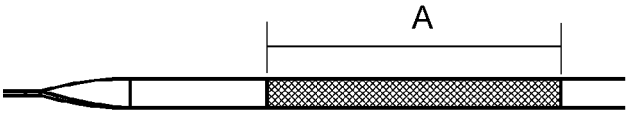


Illustration 160 g01239233

12. The engine oil level gauge (3) is located to the left of the filler cap. Maintain the engine oil level in the shaded area (A) of the oil level gauge.

13. If necessary, add oil through the filler tube.

14. Close the access door and stop the engine.

Fast Fill

If your machine is equipped with a service center, you may drain the engine oil through the fast fill port or you may add the engine oil through a fast fill port.

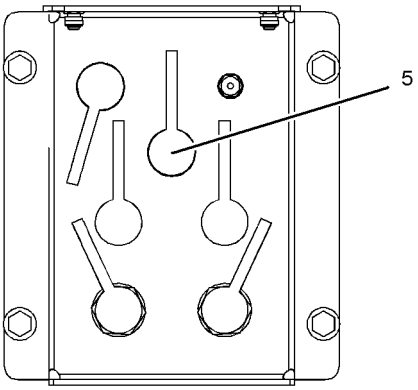


Illustration 161 g01338920

1. Remove the dust cover (5).

2. Attach the hose to the male coupling. Use a 126-7539 Nozzle for this port.

3. Drain the oil or add the oil, as needed.

Reference: For more information, refer to Operation and Maintenance Manual, “Service Center”.

i04538255

Engine Valve Lash - Check

SMCS Code: 1105-535

In order to perform the valve lash adjustment, refer to Systems Operation, Testing and Adjusting, “Engine Valve Lash - Inspect/Adjust”.

Note: A qualified mechanic should adjust the engine valve lash because special tools and training are required.

i03952000

Engine Valve Rotators - Inspect

SMCS Code: 1109-040

⚠ WARNING

When inspecting the valve rotators, protective glasses or face shield and protective clothing must be worn, to prevent being burned by hot oil or spray.

Caterpillar recommends replacing valve rotators that are operating improperly. An improperly operating valve rotator will shorten valve life because of accelerated wear on the valves. Also, metal particles from a damaged valve rotator could fall into the cylinder and damage to the piston head and to the cylinder head may result.

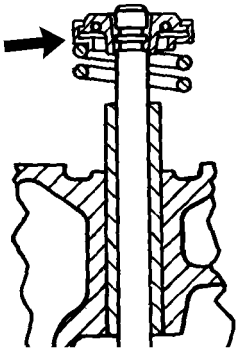


Illustration 162 g00882731

Start the engine and run the engine at low idle. Watch the top surface of each valve rotator. Whenever an inlet valve closes or an exhaust valve closes, each valve rotator should turn.

If a valve rotator fails to turn, consult your Cat dealer for service.

i02482098

Engine Water Pump - Inspect

SMCS Code: 1361-040

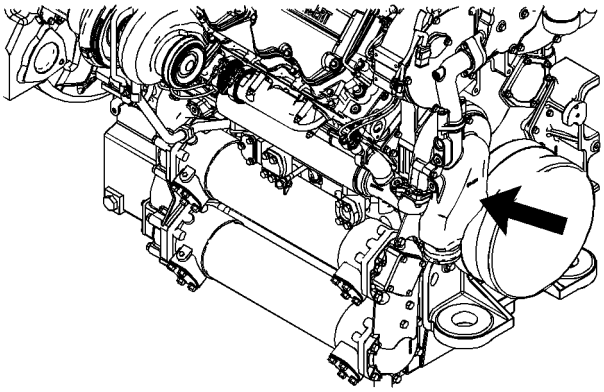


Illustration 163 g01239795

Failure of the engine water pump may cause severe engine overheating problems such as cracks in the cylinder head or piston seizure.

Visually inspect the water pump for leaks. If you find leaks, all of the seals on the water pump must be replaced.

Note: For more information, refer to the appropriate Disassembly and Assembly manual for your machine's engine.

i04411153

Ether Starting Aid Cylinder - Replace

SMCS Code: 1456-510-CD

⚠ WARNING

Breathing ether vapors or repeated contact of ether with skin can cause personal injury. Personal injury may occur from failure to adhere to the following procedures.

Use ether only in well ventilated areas.

Do not smoke while changing ether cylinders.

Use ether with care to avoid fires.

Do not store replacement ether cylinders in living areas or in the operator's compartment.

Do not store ether cylinders in direct sunlight or at temperatures above 49 °C (120 °F).

Discard cylinders in a safe place. Do not puncture or burn cylinders.

Keep ether cylinders out of the reach of unauthorized personnel.

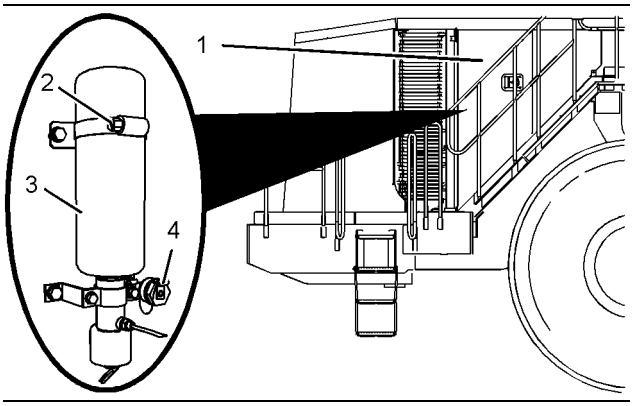


Illustration 164 g02608016

1. Open the access door on the right side of the machine. The ether starting aid cylinder (1) is located next to the hinge of the access door.

2. Loosen the cylinder retaining clamp. Unscrew the empty ether starting aid cylinder and remove the ether starting aid cylinder.

1. Open engine access cover (1) on the right side of the machine.

2. Loosen clamp (2) and unscrew ether starting aid cylinder (3).

3. Remove the used gasket. Install the new gasket that is provided with the ether starting aid cylinder. Install the new ether starting aid cylinder. Tighten the clamp.

Note: Install protective cap (4) if an ether starting aid cylinder will not be in place.

i04411257

Fuel System - Prime

SMCS Code: 1250-548

⚠ WARNING

Personal injury or death may result from failure to adhere to the following procedures.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Clean up all leaked or spilled fuel. Do not smoke while working on the fuel system.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

Prime the fuel system in order to purge trapped air and in order to fill the fuel filter.

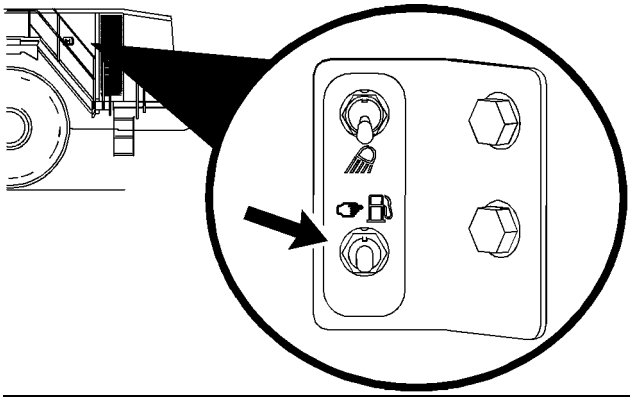


Illustration 165 g02608596

Priming pump switch

The switch for the priming pump is located near the hinge of the engine access door on the left side of the machine.

Note: The engine start switch must be in the OFF position in order to prime the fuel system.

1. Hold the priming pump switch upward in order to activate the electric fuel priming pump. The priming pump will fill the engine fuel lines and the fuel filters with fuel.

2. As the air is purged from the fuel system, fuel pressure will increase. Listen for the electric fuel priming pump to come under load. Do not continue priming the fuel system after the priming pump is under load. Do not operate the priming pump for more than 2 minutes.

3. If the engine starts but the engine runs rough, continue to run the engine at low idle until the engine runs smoothly.

4. If the engine does not start after several attempts, consult your Cat dealer.

i04749591

Fuel System Primary Filter (Water Separator) - Check/Drain

SMCS Code: 1263-535; 1263-543

⚠ WARNING

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire. To help prevent possible injury, turn the start switch off when changing fuel filters or water separator elements. Clean up fuel spills immediately.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”for tools and supplies to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations.

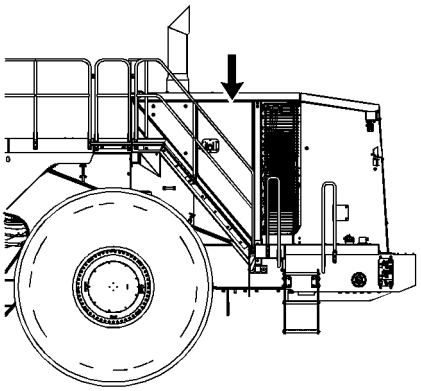


Illustration 166 g01268813

1. The fuel filter is located inside the access doors on the left side of the machine.

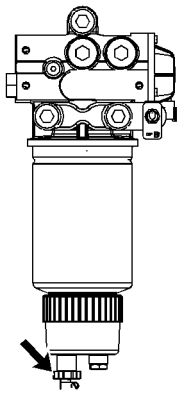


Illustration 167 g02846476

2. Install a suitable drain hose onto the drain. Place the other end of the hose into a suitable container.

3. Open the drain. Allow the fluid to drain into the container.

4. After the separator is drained, close the drain by hand pressure only. Dispose of the drained fluid in a safe place.

5. Close the access doors.

i02535268

Fuel System Primary Filter - Clean/Replace

SMCS Code: 1260-070; 1260-510

WARNING

Personal injury can result from air pressure.

Personal injury can result without following proper procedure. When using pressure air, wear a protective face shield and protective clothing.

Maximum air pressure at the nozzle must be less than 205 kPa (30 psi) for cleaning purposes.

WARNING

Personal injury or death can result from engine overspeed.

If the engine overspeeds, it can cause injury or parts damage.

Be prepared to stop the engine by closing the air off to the air inlets or by manually pushing downward on the governor shutdown rod.

WARNING

Personal injury or death can result from a fire.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Clean up all leaked or spilled fuel. Do not smoke while working on the fuel system.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

NOTICE
Do not fill fuel filter with fuel before installing the fuel filter. Contaminated fuel causes accelerated wear to fuel system parts.

Note: In order to reduce contamination in the system, do not remove the primary fuel filter and the secondary fuel filter simultaneously. Perform these operations separately.

Note: After the engine has stopped, you must wait for 60 seconds in order to allow the fuel pressure to be purged from the high pressure fuel lines before any service or repair is performed on the engine fuel lines.

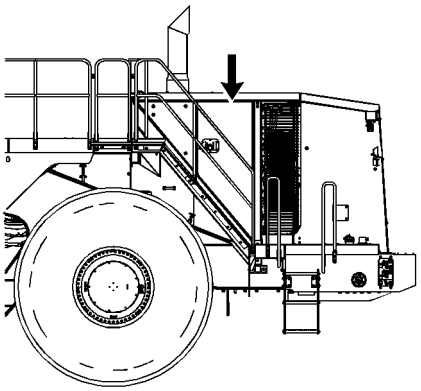


Illustration 168 g01268813

1. Open the engine access door on the left side of the machine.
2. Place a suitable container under the water separator in order to catch any fuel that might spill. Clean up any spilled fuel. Clean the outside of the water separator.

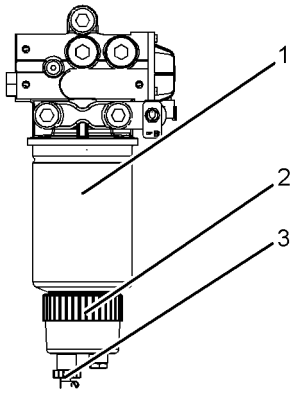


Illustration 169 g01237351

3. Install a suitable hose onto the drain (3). Place the end of the hose into a suitable container.
4. Open the drain. Allow the fluid to drain into the container.
5. Tighten the drain by hand pressure only.
6. Unscrew the bowl (2) from the primary filter (1).
7. Use a Caterpillar strap wrench in order to remove the filter. Discard the old seals and the canister in a safe place.
8. Clean the bowl.
9. Install a new filter.
   a. Apply a thin coat of oil to the seal on the new filter.

b. Install a new filter hand tight until the seal of the filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the filter, use the rotation index marks as a guide.

c. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide. For non-Caterpillar filters, use the instructions that are provided with the filter.

Note: You may need to use a Caterpillar strap wrench, or another suitable tool, in order to turn the filter to the amount that is required for final installation. Make sure that the installation tool does not damage the filter.

10. Screw the bowl onto the primary filter.

11. Close the access doors.

12. Be sure to dispose of the fuel in a safe place.

13. Prime the fuel system. Refer to Operation and Maintenance Manual, “Fuel System - Prime” for more information. Close the access door.

i02535851

Fuel System Secondary Filter - Replace

SMCS Code: 1261-510-SE

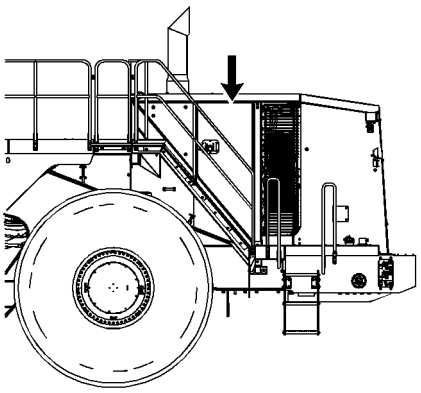


Illustration 170 g01268813

1. Open the engine access door on the left side of the machine.

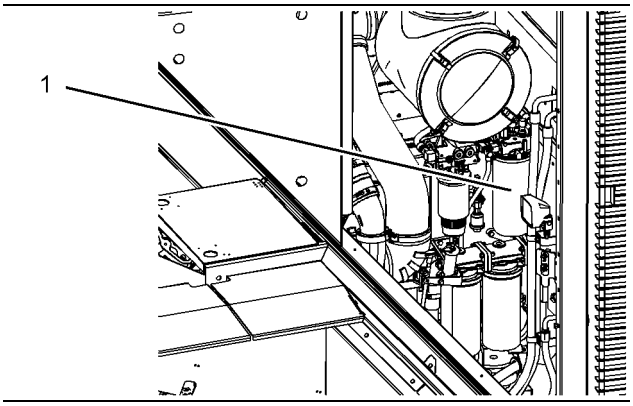


Illustration 171 g01269132

2. Remove the secondary fuel filter (1). Dispose of the used filter properly.

3. Clean the filter mounting base. Ensure that all of the used gasket is completely removed from the filter mounting base.

4. Install the new filter.

a. Apply a thin coat of oil to the seal on the new filter.

b. Install the new filter hand tight until the seal of the filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the filter, use the rotation index marks as a guide.

c. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide. For non-Caterpillar filters, use the instructions that are provided with the filter.

Note: You may need to use a Caterpillar strap wrench, or another suitable tool, in order to turn the filter to the amount that is required for final installation. Make sure that the installation tool does not damage the filter.

5. Prime the fuel system.

6. Start the engine and check the fuel filter for leaks.

7. Close the access door.

i02536034

Fuel Tank Cap and Strainer - Clean

SMCS Code: 1273-070-Z2; 1273-070-STR

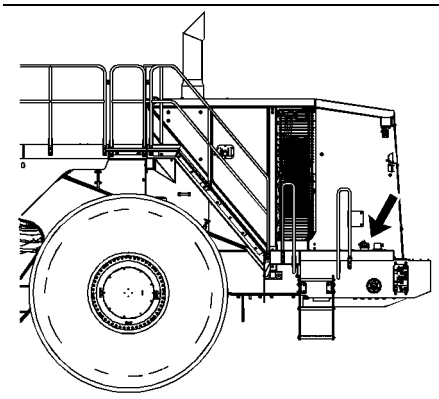


Illustration 172 g01269180

The fuel tank cap is located on the left side of the bumper.

1. Remove the fuel tank cap.
2. Remove the strainer from the filler opening.
3. Wash the fuel tank cap and the strainer in a clean, nonflammable solvent.
4. Install the strainer into the filler opening.
5. Install the fuel tank cap.

i04411658

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S

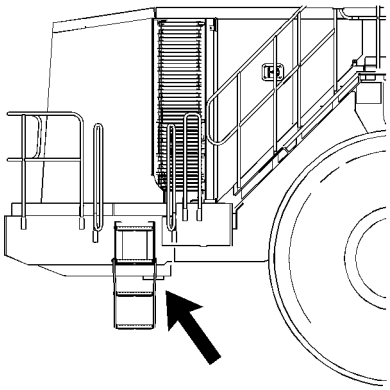


Illustration 173 g02609856

The three drain valves are under the fuel tank at the rear of the machine.

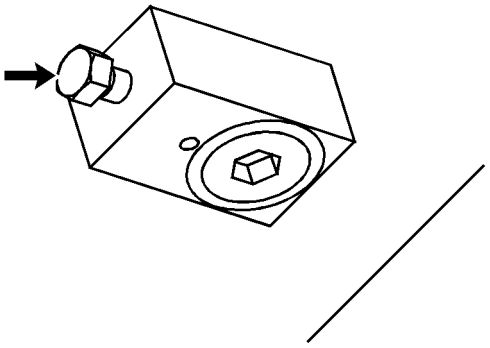


Illustration 174 g01111712

1. Open the drain valves. Allow the water and the sediment to drain into a suitable container.
2. Close the drain valves.

i02534113

Fuses - Replace

SMCS Code: 1417-510

NOTICE
Replace the fuses with the same type and size only. Otherwise, electrical damage can result.

If it is necessary to replace fuses frequently, an electrical problem may exist. Contact your Caterpillar dealer

Fuses – Fuses protect the electrical system from damage that is caused by overloaded circuits. Replace the fuse if the element separates. If the element of a new fuse separates, check the circuit. Repair the circuit, if necessary.

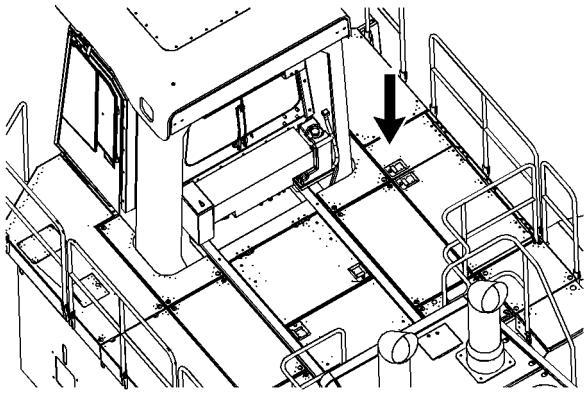


Illustration 175 g01267032

The fuse panel is located under the access door on the right side of the cab platform.

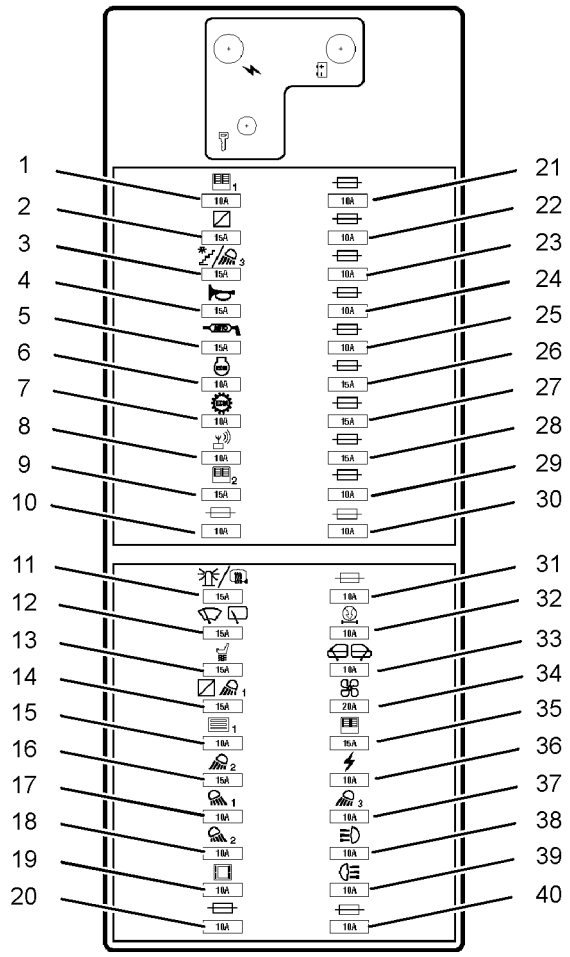


Illustration 176 g01267591

(1) Monitoring System – 10 Amp

(2) Voltage Converter – 15 Amp

(3) Stairway Access Light – 15 Amp

(4) Horn – 15 Amp

(5) Automatic Lubrication System – 15 Amp

(6) Engine Electronic Control Module – 10 Amp

(7) Transmission Electronic Control Module – 10 Amp

(8) Product Link – 10 Amp

(9) Implement Electronic Control Module – 15 Amp

(10) Spare – 10 Amp

(11) Beacon and Heated Mirror – 15 Amp

(12) Front Wipers and Rear Wipers – 15 Amp

(13) Seat and Air Compressor – 15 Amp

(14) Implement Electronic Control Module – 10 Amp

(15) Front Floodlights (ROPS) – 15 Amp

(16) Rear Floodlights (Radiator) – 10 Amp

(17) Rear Floodlights (ROPS) – 10 Amp

(18) WAVS Monitor – 10 Amp

(19) Spare – 10 Amp

(20) Spare – 10 Amp

(21) Spare – 10 Amp

(22) Spare – 10 Amp

(23) Spare – 10 Amp

(24) Spare – 10 Amp

(25) Spare – 10 Amp

(26) Spare – 15 Amp

(27) Spare – 15 Amp

(28) Spare – 15 Amp

(29) Spare – 10 Amp

(30) Spare – 10 Amp

(31) Spare – 10 Amp

(32) Precleaner for the Cab – 10 Amp

(33) Side Wipers – 10 Amp

(34) Blower Motor – 20 Amp

(35) Monitoring System – 15 Amp

(36) Power Train Control – 15 Amp

(37) Front Floodlights (Fender) – 10 Amp

(38) Front HID Lights (ROPS) – 15 Amp

(39) Rear HID Lights (Fender) – 10 Amp

(40) Spare – 10 Amp

i02245859

High Intensity Discharge Lamp (HID) - Replace (If Equipped)

SMCS Code: 1434-510

⚠ WARNING

HID lamps operate at very high voltages. To avoid electrical shock and personal injury, disconnect power before servicing HID lamps.

⚠ WARNING

HID bulbs become very hot during operation. Before servicing, remove power from lamp for at least five minutes to ensure lamp is cool.

NOTICE
Although HID bulb materials may change over time, HID bulbs produced at the time of the printing of this manual contain mercury. When disposing of this component, or any waste that contains mercury, please use caution and comply with any applicable laws.

1. Remove the electrical power from the high intensity discharge lamp (HID). The electrical power must be removed from the HID lamp for at least five minutes, in order to ensure that the bulb is cool.

2. Disassemble the housing for the HID lamp in order to have access to the bulb.

Note: On some HID lamps, the bulb is an integral part of the lens assembly. The bulb is not removed separately from the lens assembly. Replace the entire lens assembly on these HID lamps.

3. Remove the bulb from the HID lamp.

4. Install the replacement bulb in the HID lamp.

   If the bulb is an integral part of the lens assembly, install the replacement lens assembly in the HID lamp.

Note: In order to avoid failure to the bulb that is premature, avoid touching the bulb's surface with your bare hands. Clean any fingerprints from the bulb with alcohol prior to operation.

5. Reassemble the housing for the HID lamp. Ensure that any printing on the lens is oriented correctly with respect to the HID lamp's mounting position on the machine.

6. Reattach the electrical power to the HID lamp.

7. Check the HID lamp for proper operation.

Note: Consult your Caterpillar dealer for additional information on HID lamps.

i02599085

High Pressure Screens - Clean/Replace (If Equipped)

SMCS Code: 5068-070-Z3; 5068-510-Z3

There are a total of 7 hydraulic screens on your machine. If the system becomes contaminated or if a major failure occurs, clean the screens. If a screen is damaged, replace the screen.

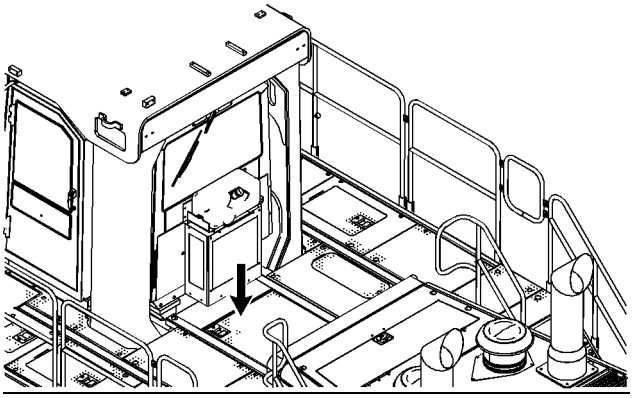


Illustration 177 g01260005

The screen for the steering pump is located inside the access door directly behind the cab.

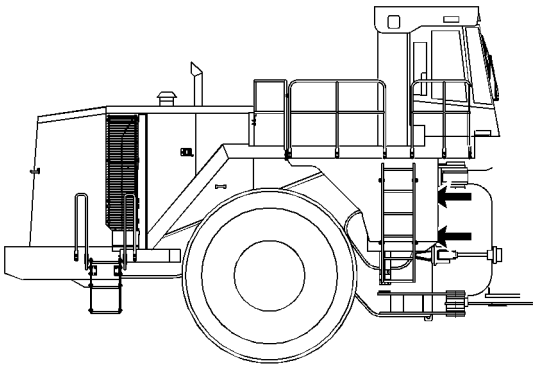


Illustration 178 g01301067

There are two screens for the implement pump that are located inside the rear frame near the articulation joint. If equipped, a screen for the secondary steering pump is located inside the rear frame near the articulation joint. These screens are accessible from the right side of the machine.

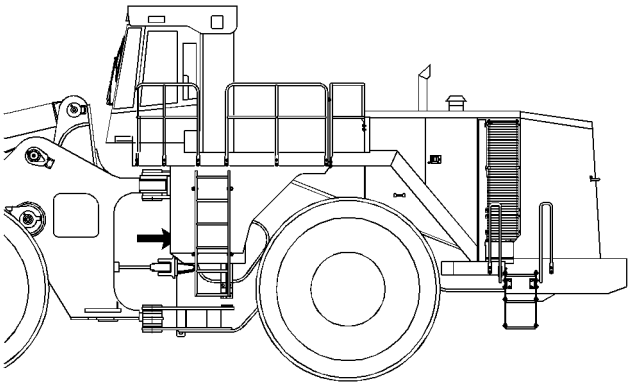


Illustration 179 g01301066

The screen for the brake pump is located behind the hydraulic tank on the left side of the machine.

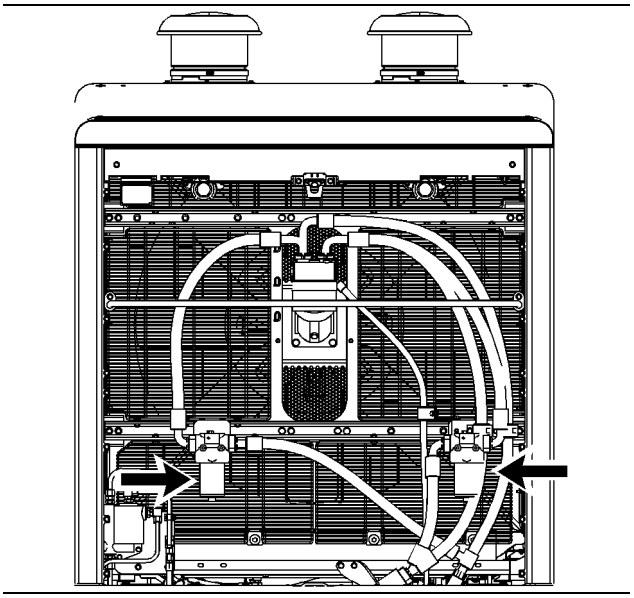


Illustration 180 g01301064

The screens for the fan pump and the fan motor are located behind the fan guard on the rear of the machine.

1. Stop the engine.
2. Remove the drain plug at the bottom of the filter housing. Allow the oil to drain into a suitable container.
3. Use a strap type wrench to remove the filter housing.
4. Remove the high pressure screens from the filter housing.
5. Clean the screen, the drain plug, the filter housing, and the filter housing base with a clean, nonflammable solvent. Allow the components to dry.
6. Install the screen and the drain plug in the filter housing.
7. Install the filter housing on the filter housing base.
8. Start the engine. Make sure that the parking brake is engaged.
9. Operate the steering, the brakes, and the attachment in order to circulate the oil. Check the high pressure screens for leaks.
10. Stop the engine.

i03898378

Hoses and Clamps - Inspect/Replace

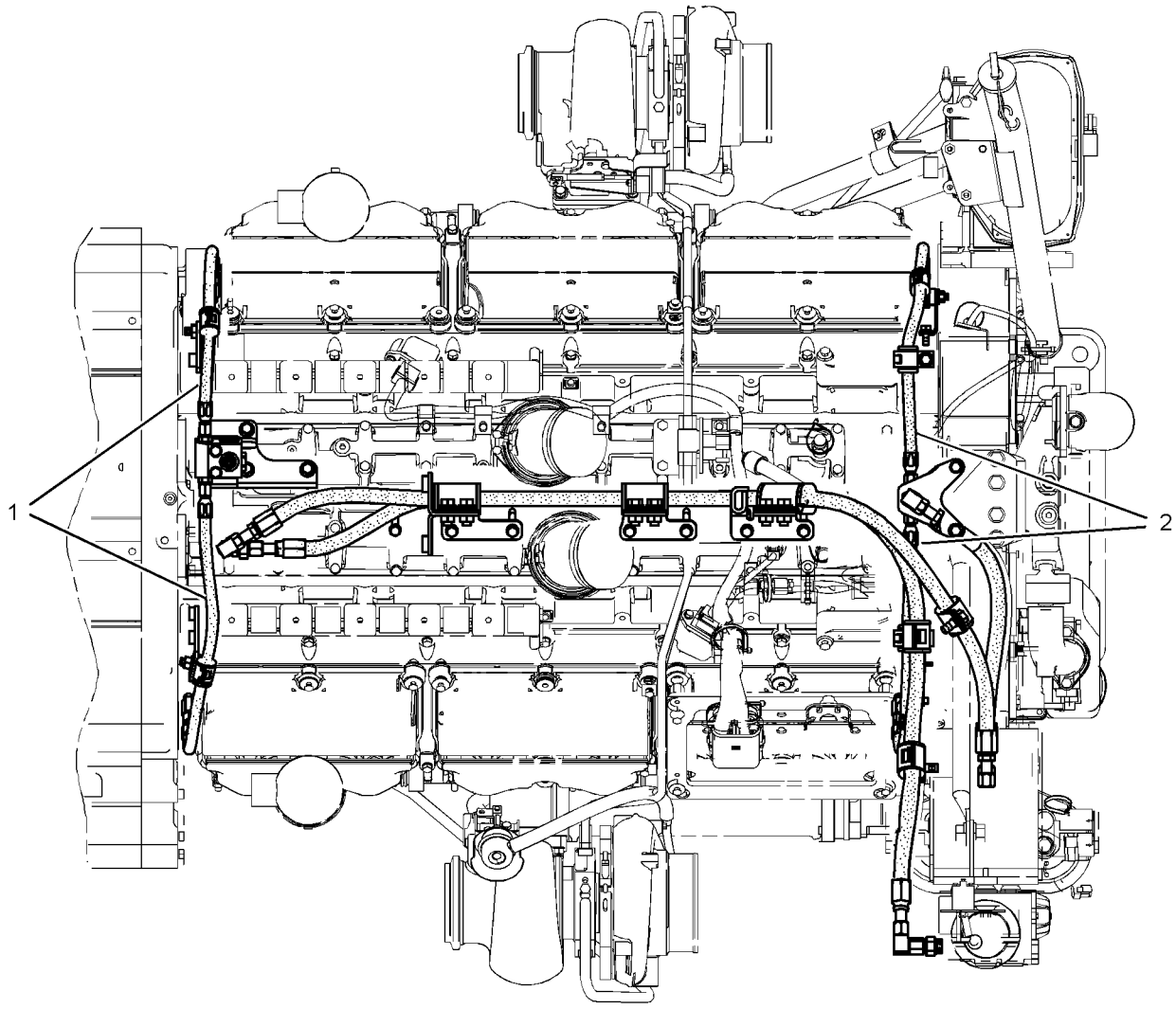
SMCS Code: 1000; 7554-040; 7554-510

Inspect the Hoses and the Clamps

The nonmetallic hoses and the clamps must be inspected periodically in order to ensure safe operation and continuous operation of the engine fuel system. Take proper safety precautions before inspecting or replacing hoses and clamps.

Note: Always use a board or cardboard when the engine components are checked for leaks. Leaking fluid that is under pressure can cause serious injury or possible death, including leaks that are the size of a pin hole. Refer to Operation and Maintenance Manual, “General Hazard Information” for more information.

Nonmetallic Fuel Lines



TOP VIEW OF ENGINE

Illustration 181 g02141367

(1) Rear low-pressure fuel lines (2) Front low-pressure fuel lines

Inspect hoses (1) and (2) of the engine fuel system for leaks that are caused by the following conditions.

Replace any non-metallic fuel line (hose) which exhibits any of the following conditions.

- Hoses which are cracked
- Hoses which are soft
- Outer covering that is chafed or cut
- Outer covering that is ballooning locally
- Flexible part of the hose that is kinked or crushed
- Hoses which exhibit signs of leakage which are not the result of loose couplings or clamps

Failure to replace a non-metallic fuel line (hose) which exhibits any of the above conditions may result in a hazardous situation.

Inspect all clamps for the following conditions. Replace any clamp which exhibits signs of any of the following conditions.

- Cracking
- Looseness
- Damage

Inspect all couplings for leaks. Replace any coupling which exhibits signs of leaks.

Each installation application can be different. The differences depend on the following factors:

- Type of hose
- Type of fitting material
- Anticipated expansion and contraction of the hose
- Anticipated expansion and contraction of the fittings

Due to extreme temperature changes, the hose will heat set. Heat setting causes hose clamps to loosen. The loose clamp can result in leaks. A constant torque hose clamp will help to prevent loose hose clamps.

Replace hoses that are cracked or soft. Replace hoses that show signs of leakage. Replace hoses that show signs of damage. Replace hose clamps that are cracked or damaged. Tighten or replace hose clamps which are loose.

Replace the Hoses and the Clamps

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Dealer Service Tool Catalog” or refer to Special Publication, PECJ0003, “Caterpillar Shop Supplies and Tools Catalog” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Nonmetallic Fuel Lines

⚠ WARNING

Personal injury can result from removing hoses or fittings in a pressure system.

Failure to relieve pressure can cause personal injury.

Do not disconnect or remove hoses or fittings until all pressure in the system has been relieved.

NOTICE
Do not allow dirt to enter the fuel system. Thoroughly clean the area around a fuel system component that will be disconnected. Fit a suitable cover over any disconnected fuel system components.

Replace the non-metallic fuel lines in a set.

1. Stop the engine and turn off the fuel supply.
2. Turn the battery disconnect switch to the OFF position.
3. Drain the fuel from the fuel system to a level that is below the hose that is being replaced.
4. Remove the hose clamps.
5. Disconnect the old hose. Refer to Illustration 181.
6. Replace the old hose with a new hose.
7. Install hose clamps which have been inspected or install new hose clamps. Refer to Specifications, SENR3130, “Torque Specifications”, “Hose Clamps” for information about selecting and installing the proper hose clamps.
8. Carefully inspect the engine for any spilled fuel. Make sure that no fuel remains on or close to the engine.

Note: Fuel must be added to the fuel system ahead of the fuel filter.

9. Refill the fuel system. Refer to this Operation and Maintenance Manual, “Fuel System - Prime” for information about priming the engine with fuel.
10. Start the engine. Inspect the fuel system for leaks.

i03245638

Hydraulic System Oil (Implement) (Hydraulic Fan) - Change

SMCS Code: 5056-044

Selection of the Oil Change Interval

Your machine may be able to use a 4000 hour interval for the hydraulic oil. The hydraulic oil is in the system that is not integral to the service brakes, the clutches, the final drives, or the differentials. The standard change interval is 2000 hours. The oil should be monitored in additional increments of 500 hours. The extended 4000 hour interval can be used if the following criteria are met.

HYDO Advanced 10

Cat HYDO Advanced 10 is the preferred oil for use in most Caterpillar machine hydraulic and hydrostatic transmission systems when ambient temperature is between −20 °C (−4 °F) and 40 °C (104 °F). Cat HYDO Advanced 10 has an SAE viscosity grade of 10W. **Cat HYDO Advanced 10 has a 50% increase in the standard oil drain interval** (up to 3000 hours) for machine hydraulic systems over second and third choice oils when you follow the maintenance interval schedule for oil filter changes and for oil sampling that is stated in the Operation and Maintenance Manual. 6000 hour oil drain intervals are possible when using S·O·S Services oil analysis. When you switch to Cat HYDO Advanced 10, cross contamination with the previous oil should be kept to less than 10%. Consult your Cat dealer for details about the benefits from the improved performance designed into Cat HYDO Advanced 10.

Oil Filters

Caterpillar oil filters are recommended. The interval for changing the oil filter should be 500 hours.

Oil

The 6000 hour interval for changing the oil is specific to HYDO Advance 10.

The 4000 hour interval for changing the oil is for the following oil types.

- Cat Hydraulic Oil (HYDO)
- CatTransmission/Drive Train Oil (TDTO)
- Cat TDTO-TMS
- Cat Diesel Engine Oil
- Cat Biodegradable Hydraulic Oil (HEES)
- Cat Multipurpose Tractor Oil (MTO)
- Heavy-Duty Diesel Engine Oil with a minimum zinc content of 900 parts per million (ppm)

Heavy-duty oils are identified by the following classifications: ECF-1, CG-4, CF, and TO-4.

Note: Industrial hydraulic oils are not recommended for use in Caterpillar hydraulic systems. These oils are more likely to cause corrosion and excessive wear.

Monitoring the Condition of the Oil

The oil should be monitored during intervals of 500 hours. Caterpillar's standard S·O·S Fluids Analysis or an equivalent oil sampling program should be used.

If an oil sampling program is not available, the standard 2000 oil change interval should be used.

Measured Data

The following information should be monitored when you sample the oil:

- Significant changes in wear metals should be monitored. These metals include iron, copper, chromium, lead, aluminum, and tin.
- The following additives should be observed for significant changes: Zinc, calcium, magnesium, and phosphorus.
- Contaminants should not be present. These contaminants include fuel and antifreeze. Water content should be .5 percent or less.
- The silicon level should not exceed 15 parts per million for new oil. The particle counts should be monitored.
- The recommended level of cleanliness for Caterpillar machines that are operated in the field is ISO 18/15 or cleaner. The cleanliness should be monitored by particle count analysis. The levels of contamination should not exceed normal levels by more than two ISO codes. Action should be taken in order to determine the cause of the contamination. The system should be returned to the original levels of contamination.
- There should not be significant changes in sodium, silicon, copper, and potassium.

- The allowable level of oxidation is 40 percent (0.12 Abs units).
- The kinematic viscosity at 100 °C (212 °F) should not exceed a 2 cSt change.

Procedure for Changing the Hydraulic Oil

NOTICE
Care must be taken to ensure that all fluids are contained during performance of inspection, maintenance, testing, adjusting and the repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Dispose of all fluids according to local regulations and mandates.

Note: Be sure that you obtain an S·O·S hydraulic oil sample before you drain the hydraulic oil.

1. Operate the machine in order to warm the oil.
2. Park the machine on level ground. Lower the work tool to the ground with a slight downward pressure. Engage the parking brake and stop the engine.

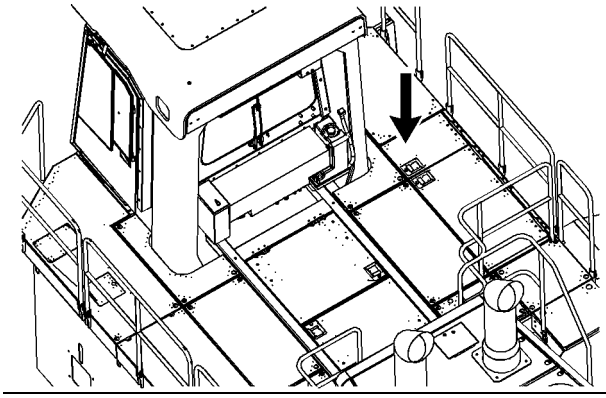


Illustration 182 g01267032

3. Open the access door to the right of the cab.

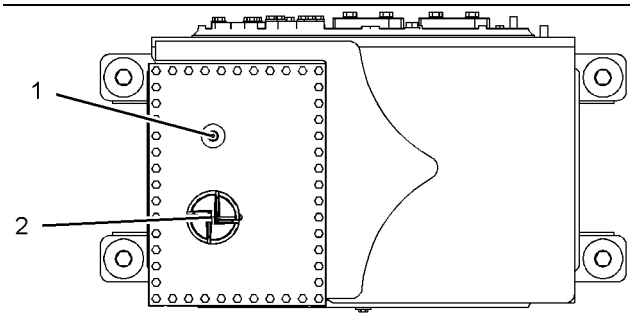


Illustration 183 g01269818

4. Push the button on the top of breaker relief valve (1) in order to relieve any tank pressure.
5. Remove hydraulic tank filler cap (2). Remove the strainer from the tube.
6. Wash the strainer and the filler cap in a clean, nonflammable solvent.

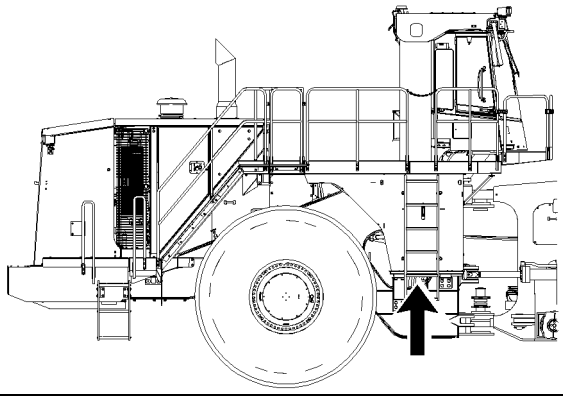


Illustration 184 g01269820

7. There is an access area for the drain plug on the bottom of the hydraulic tank. Remove the oil drain plug and drain the oil into a suitable container.
8. Clean the drain plug and install the drain plug.
9. Install the filler strainer.

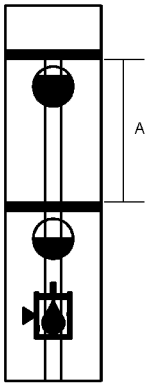


Illustration 185 g01237715

10. Fill the hydraulic oil tank with clean oil. Make sure that the oil level is within the green range (A) on the sight gauge.

11. Start the engine and run the engine for at least ten seconds. Then, stop the engine and add hydraulic oil to the tank until the oil level is in the green range (A) on the sight gauge.

12. Start the engine and run the engine at low idle. Cycle the implements so that all hydraulic systems are filled with oil.

13. Stop the engine and top off the hydraulic tank so that the oil level is within the green range(A) on the sight gauge.

Note: The oil must be free of air bubbles. If air bubbles are present in the hydraulic oil, air is entering the hydraulic system. Inspect the hydraulic suction line and the hose clamps.

14. If necessary, tighten any loose clamps or any loose connections. Replace any damaged hoses.

15. Inspect the gasket on the hydraulic tank filler cap for damage. Replace the gasket, if necessary. Install the filler cap.

16. Stop the engine. Close the access door.

Fast Fill Port

If your machine is equipped with a service center, you may drain the hydraulic oil through the fast fill port or you may add the hydraulic oil through a fast fill port.

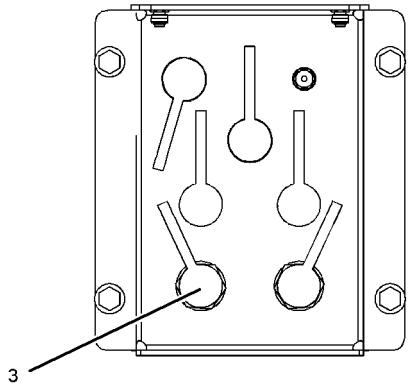


Illustration 186 g01338923

1. Remove the dust cover (3).

2. Attach the hose to the male coupling. Use a 127-9088 Nozzle for this port.

3. Drain the oil or add the oil, as needed.

Reference: For more information, refer to Operation and Maintenance Manual, “Service Center”.

i03245636

Hydraulic System Oil (Steering) (Brake) - Change

SMCS Code: 5056-044

⚠ WARNING

Personal injury can result from hydraulic oil pressure and hot oil.

Hydraulic oil pressure can remain in the hydraulic system after the engine has been stopped. Serious injury can be caused if this pressure is not released before any service is done on the hydraulic system.

Make sure all of the attachments have been lowered, oil is cool before removing any components or lines. Remove the oil filler cap only when the engine is stopped, and the filler cap is cool enough to touch with your bare hand.

Selection of the Oil Change Interval

Your machine may be able to use a 4000 hour interval for the hydraulic oil. The hydraulic oil is in the system that is not integral to the service brakes, the clutches, the final drives, or the differentials. The standard change interval is 2000 hours. The oil should be monitored in additional increments of 500 hours. The extended 4000 hour interval can be used if the following criteria are met.

HYDO Advanced 10

Cat HYDO Advanced 10 is the preferred oil for use in most Caterpillar machine hydraulic and hydrostatic transmission systems when ambient temperature is between −20 °C (−4 °F) and 40 °C (104 °F). Cat HYDO Advanced 10 has an SAE viscosity grade of 10W. **Cat HYDO Advanced 10 has a 50% increase in the standard oil drain interval** (up to 3000 hours) for machine hydraulic systems over second and third choice oils when you follow the maintenance interval schedule for oil filter changes and for oil sampling that is stated in the Operation and Maintenance Manual. 6000 hour oil drain intervals are possible when using S·O·S Services oil analysis. When you switch to Cat HYDO Advanced 10, cross contamination with the previous oil should be kept to less than 10%. Consult your Cat dealer for details about the benefits from the improved performance designed into Cat HYDO Advanced 10.

Oil Filters

Caterpillar oil filters are recommended. The interval for changing the oil filter should be 500 hours.

Oil

The 6000 hour interval for changing the oil is specific to HYDO Advance 10.

The 4000 hour interval for changing the oil is for the following oil types.

- Caterpillar Hydraulic Oil (HYDO)
- CaterpillarTransmission/Drive Train Oil (TDTO)
- Caterpillar TDTO (TMS)
- Caterpillar Diesel Engine Oil
- Caterpillar Biodegradable Hydraulic Oil (HEES)
- Caterpillar Multipurpose Tractor Oil (MTO)
- Heavy-Duty Diesel Engine Oil with a minimum zinc content of 900 parts per million (ppm)

Heavy-duty oils are identified by the following classifications: CF, CF-4, CG-4, and CH-4.

Note: Industrial hydraulic oils are not recommended in Caterpillar hydraulic systems. These oils are more likely to cause corrosion and excessive wear.

Monitoring the Condition of the Oil

The oil should be monitored during intervals of 500 hours. Caterpillar's standard S·O·S Fluids Analysis or an equivalent oil sampling program should be used.

If an oil sampling program is not available, the standard 2000 oil change interval should be used.

Measured Data

The following information should be monitored when you sample the oil:

- Significant changes in wear metals should be monitored. These metals include iron, copper, chromium, lead, aluminum, and tin.
- The following additives should be observed for significant changes: Zinc, calcium, magnesium, and phosphorus.
- Contaminants should not be present. These contaminants include fuel and antifreeze. Water content should be .5 percent or less.
- The silicon level should not exceed 15 parts per million for new oil. The particle counts should be monitored.
- The recommended level of cleanliness for Caterpillar machines that are operated in the field is ISO 18/15 or cleaner. The cleanliness should be monitored by particle count analysis. The levels of contamination should not exceed normal levels by more than two ISO codes. Action should be taken in order to determine the cause of the contamination. The system should be returned to the original levels of contamination.
- There should not be significant changes in sodium, silicon, copper, and potassium.
- The allowable level of oxidation is 40 percent (0.12 Abs units).
- The kinematic viscosity at 100 °C (212 °F) should not exceed a 2 cSt change.

Procedure for Changing the Hydraulic Oil

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Note: Be sure that you obtain an S·O·S hydraulic oil sample before you drain the hydraulic oil.

1. Operate the machine in order to warm the oil.

2. Park the machine on level ground. Lower the work tool to the ground and apply slight downward pressure. Engage the parking brake and stop the engine.

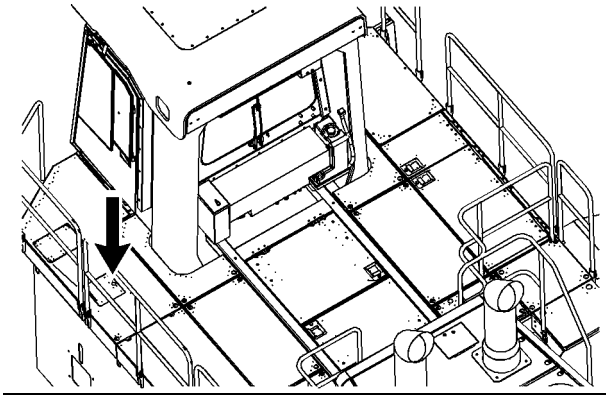


Illustration 187 g01269878

3. The hydraulic tank is located to the left of the cab. Open the access door.

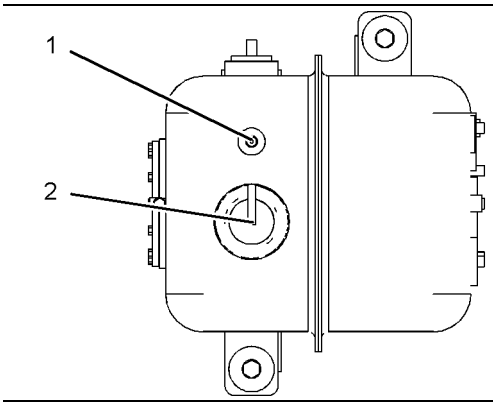


Illustration 188 g01269881

4. Push the button on the top of the breaker relief valve (1) in order to relieve any tank pressure.

5. Remove hydraulic tank filler cap (2). Remove the strainer from the tube.

6. Wash the strainer and the filler cap in a clean, nonflammable solvent.

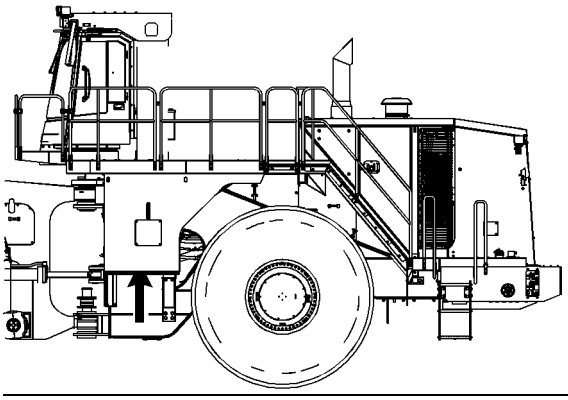


Illustration 189 g01269883

7. Remove the oil drain plug from the bottom of the hydraulic tank.

8. Attach a hose to an oil drain coupling. Install the oil drain coupling into the drain plug opening in order to open the internal drain valve. Allow the oil to drain into a suitable container.

9. Clean the drain plug and install the drain plug.

10. Install the filler strainer.

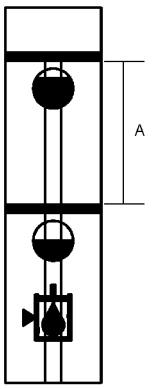


Illustration 190 g01237715

11. Fill the hydraulic oil tank with clean oil. Maintain the oil level within the green range (A) on the sight gauge.

12. Start the engine and run the engine for at least ten seconds. Then, stop the engine and add hydraulic oil to the tank until the oil level is within the green range (A) on the sight gauge.

13. Start the engine and run the engine at low idle. Operate the steering and the brakes in order to circulate the oil.

14. Stop the engine and top off the hydraulic tank so that the oil level is within the green range (A) on the sight gauge.

Note: The oil must be free of air bubbles. If air bubbles are present in the hydraulic oil, air is entering the hydraulic system. Inspect the hydraulic suction line and the hose clamps.

15. If necessary, tighten any loose clamps or any loose connections. Replace any damaged hoses.

16. Inspect the gasket on the hydraulic tank filler cap for damage. Replace the gasket, if necessary. Install the filler cap.

Fast Fill Port

If your machine is equipped with a service center, you may drain the hydraulic oil through the fast fill port or you may add the hydraulic oil through a fast fill port.

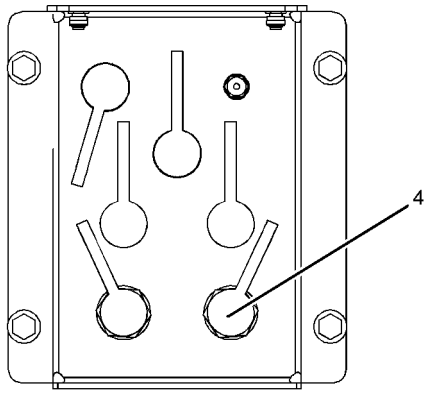


Illustration 191 g01338925

1. Remove the dust cover (3).

2. Attach the hose to the male coupling. Use a 127-9088 Nozzle for this port.

3. Drain the oil or add the oil, as needed.

Reference: For more information, refer to Operation and Maintenance Manual, “Service Center”.

i04416532

Hydraulic System Oil Filter (Hydraulic Fan Return) - Replace

SMCS Code: 5068-510-HFN

⚠ WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact the skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

Note: The pressure must be removed from the system before service can be performed. Refer to this Operation and Maintenance Manual, "System Pressure Release".

1. Park the machine on a level surface and engage the parking brake. Stop the engine.

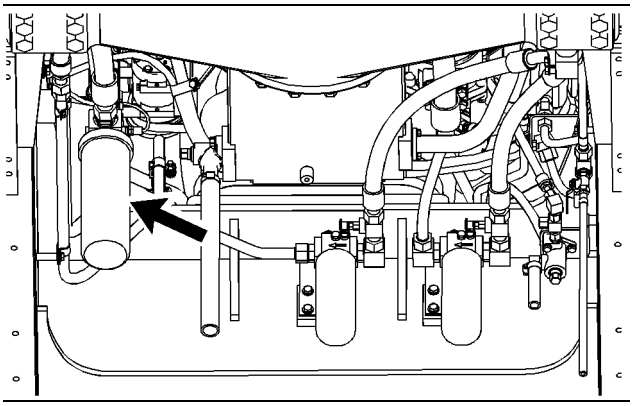


Illustration 192 g01451704

2. The hydraulic filter is located in the rear of the machine under the engine compartment. Clean the area in order to keep dirt out of the filter base.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on containing fluid spillage.

3. Remove the used filter from the filter base.

Note: Used filters should always be disposed of according to local regulations.

4. Clean the filter base.

5. Apply a thin coat of clean hydraulic oil to the seal on the new filter.

6. Install the new filter by hand.

   Instructions for the installation of the filter are printed on the side of each Cat spin-on filter. For filters that are not Cat branded, refer to the installation instructions that are provided by the supplier of the filter.

7. Start the engine and operate the machine slowly for 10 to 15 minutes.

8. Stop the engine.

9. Check the hydraulic oil level.

   Reference: For the correct procedure, refer to Operation and Maintenance Manual, "Hydraulic System Oil Level - Check".

10. Check the machine for oil leaks. Make any necessary repairs.

i02554528

Hydraulic System Oil Filter (Implement Pilot) - Replace

SMCS Code: 5068-510-II

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Stop the engine.

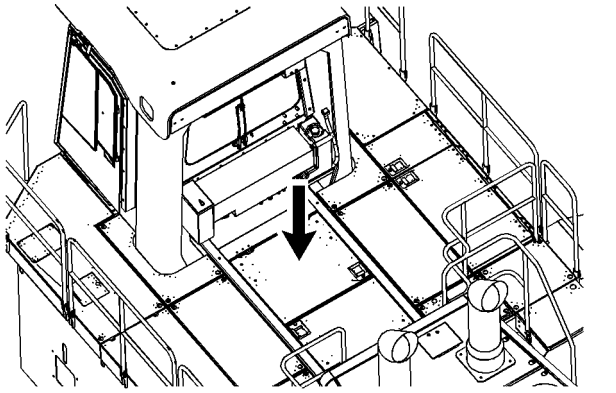


Illustration 193 g01278534

2. The hydraulic filter is located on the right side of the pump compartment. Open the access doors.

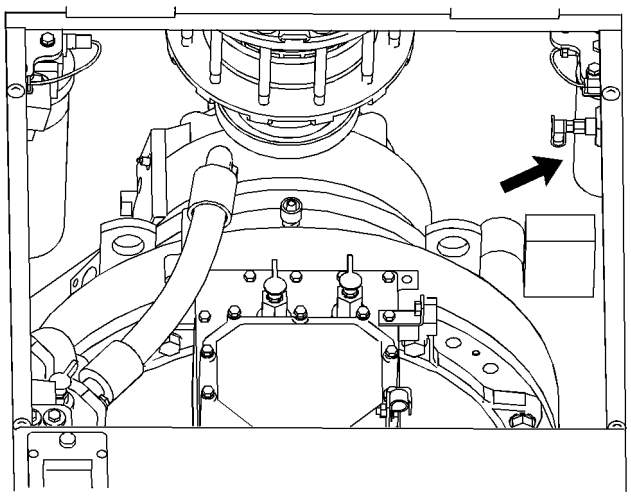


Illustration 194 g01278532

3. Remove the filter and dispose of the filter properly.

4. Apply a thin coat of oil to the seal on the new filter. Install the new filter hand tight until the seal of the filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the filter, use the rotation index marks as a guide.

5. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide. For non-Caterpillar filters, use the instructions that are provided with the filter.

Note: You may need to use a Caterpillar strap wrench, or another suitable tool, in order to turn the filter to the amount that is required for final installation. Make sure that the installation tool does not damage the filter.

6. Close the access doors.

i02554912

Hydraulic System Oil Filter (Steering Pilot) - Replace

SMCS Code: 5068-510

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Stop the engine.

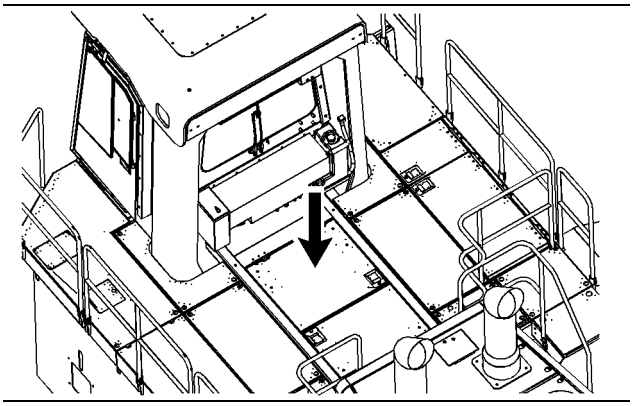


Illustration 195 g01278534

2. The hydraulic filter is located on the left side of the pump compartment. Open the access doors.

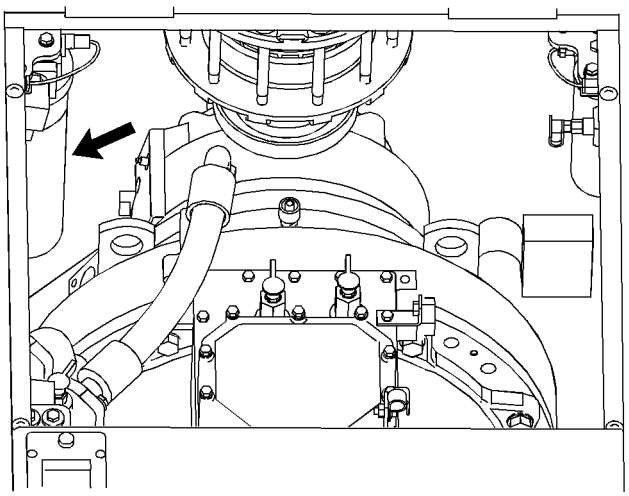


Illustration 196 g01278787

3. Remove the filter and dispose of the filter properly.

4. Apply a thin coat of oil to the seal on the new filter. Install the new filter hand tight until the seal of the filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the filter, use the rotation index marks as a guide.

5. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide. For non-Caterpillar filters, use the instructions that are provided with the filter.

Note: You may need to use a Caterpillar strap wrench, or another suitable tool, in order to turn the filter to the amount that is required for final installation. Make sure that the installation tool does not damage the filter.

6. Close the access doors.

i03247262

Hydraulic System Oil Level (Implement) (Hydraulic Fan) - Check

SMCS Code: 5056-535-FLV

1. Park the machine on a level surface and engage the parking brake.

2. Lower the attachment to the ground and stop the engine.

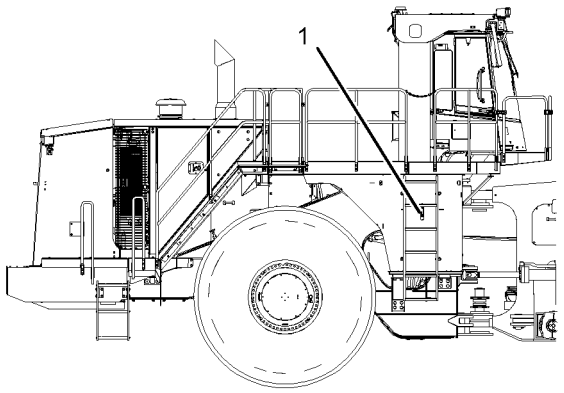


Illustration 197 g01270582

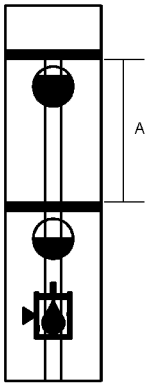


Illustration 198 g01237715

3. The oil level gauge (1) is located on the right side of the machine. Maintain the oil level within the green range (A) on the gauge.

4. The filler tube for this hydraulic tank is located inside the access door to the right of the cab. If necessary, add oil through the filler tube.

i03247263

Hydraulic System Oil Level (Steering) (Brake) - Check

SMCS Code: 5056-535-FLV

1. Park the machine on a level surface and engage the parking brake.

2. Lower the attachment to the ground and stop the engine.

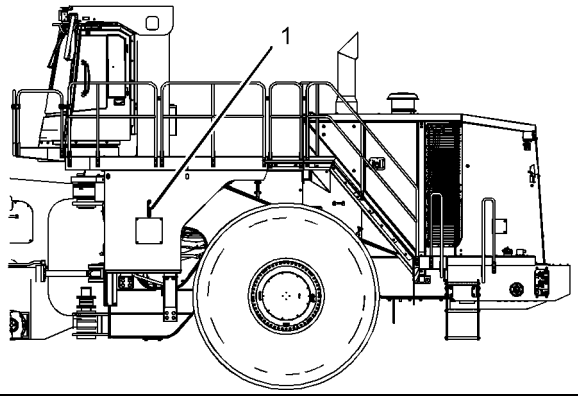


Illustration 199 g01270623

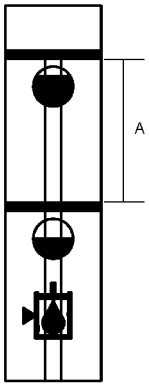


Illustration 200 g01237715

3. The oil level gauge (1) is located on the left side of the machine. Maintain the oil level within the green range (A) on the gauge.

4. The filler tube for this hydraulic tank is located inside the access door to the left of the cab. If necessary, add oil through the filler tube.

i02555469

Hydraulic System Oil Sample (Implement) (Hydraulic Fan) - Obtain

SMCS Code: 5050-008; 5056-008; 7542

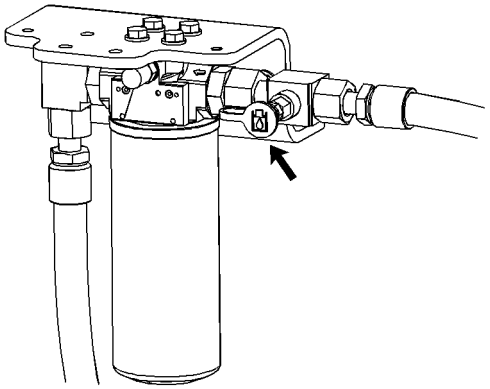


Illustration 201 g01279293

The sampling valve is located on the implement pilot filter. The implement pilot filter is located on the right side of the pump compartment.

Reference: For information on obtaining a sample, refer to Special Publication, SEBU6250, “S·O·S Oil Analysis” and Special Publication, PEHP6001, “How To Take A Good Oil Sample”.

i02961623

Hydraulic System Oil Sample (Steering) (Brake) - Obtain

SMCS Code: 4250-008; 4300-008; 5050-008; 5056-008; 7542

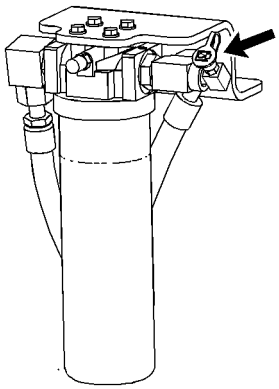


Illustration 202 g01279328

The sampling valve is located on the steering pilot filter. The steering pilot filter is located on the left side of the pump compartment.

Reference: For information on obtaining a sample, refer to Special Publication, SEBU6250, “S·O·S Oil Analysis” and Special Publication, PEHP6001, “How To Take A Good Oil Sample”.

i03247236

Hydraulic Tank Breaker Relief Valve - Clean

SMCS Code: 5118-070

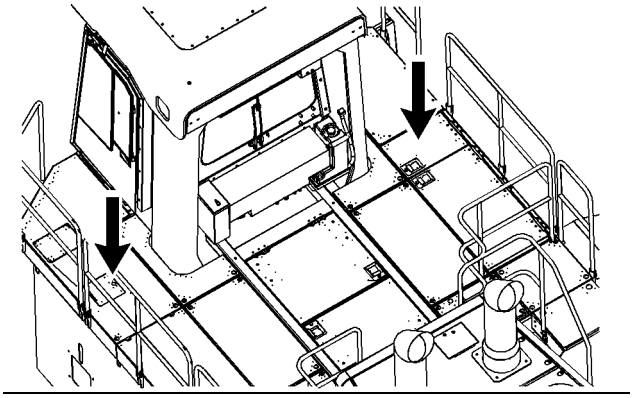


Illustration 203 g01270772

There is a breaker relief valve on both hydraulic tanks. The implement hydraulic tank is located inside the access door to the right of the cab. The steering hydraulic tank is located inside the access door to the left of the cab.

1. Open the access door.
2. Push the button on the top of the breaker relief valve in order to relieve any tank pressure.
3. Remove the breaker relief valve.
4. Clean the breaker relief valve in a clean, nonflammable solvent. Dry the breaker relief valve thoroughly by shaking or by using compressed air.
5. Install the breaker relief valve.
6. Close the access door.
7. Repeat steps 1 through 6 for the other hydraulic tank.

i02106227

Oil Filter - Inspect

SMCS Code: 1308-507; 3067-507; 4295-507; 431F-507; 5068-507

Inspect a Used Filter for Debris

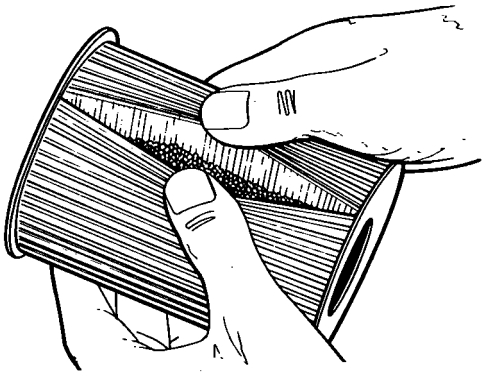


Illustration 204 g00100013

The element is shown with debris.

Use a filter cutter to cut the filter element open. Spread apart the pleats and inspect the element for metal and for other debris. An excessive amount of debris in the filter element can indicate a possible failure.

If metals are found in the filter element, a magnet can be used to differentiate between ferrous metals and nonferrous metals.

Ferrous metals can indicate wear on steel parts and on cast iron parts.

Nonferrous metals can indicate wear on the aluminum parts of the engine such as main bearings, rod bearings, or turbocharger bearings.

Small amounts of debris may be found in the filter element. This could be caused by friction and by normal wear. Consult your Caterpillar dealer in order to arrange for further analysis if an excessive amount of debris is found.

Using an oil filter element that is not recommended by Caterpillar can result in severe engine damage to engine bearings, to the crankshaft, and to other parts. This can result in larger particles in unfiltered oil. The particles could enter the lubricating system and the particles could cause damage.

i02906606

Oil Renewal System Oil - Add (If Equipped)

SMCS Code: 1348-538

Note: Keeping a daily maintenance log of all the additions of oil is necessary for determining whether the ORS is working properly.

Park the machine on level ground. Lower the attachment to the ground. Engage the parking brake and turn off the engine.

Note: There may be two methods for adding oil to the ORS on your machine.

Manual

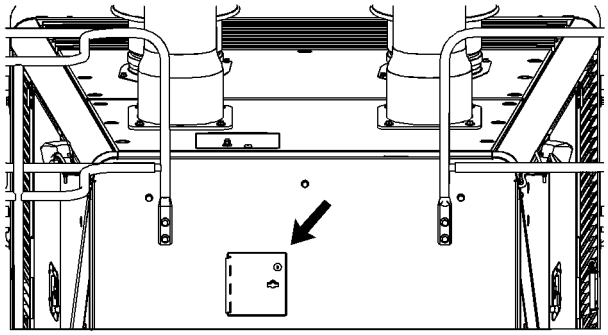


Illustration 205 g01450909

In order to fill the ORS manually, add oil through the filler tube until the sight gauge indicates that the ORS is “FULL”.

Fast Fill (If Equipped)

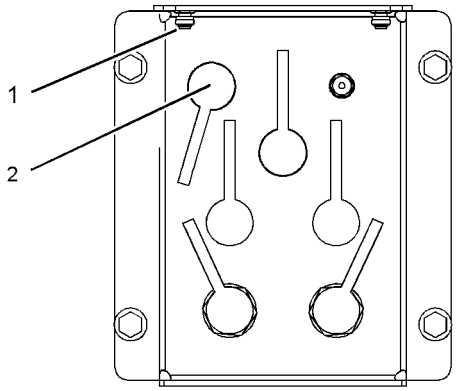


Illustration 206 g01446867

In order to fill the ORS, attach a 126-7539 Nozzle to the male coupling (2). Fill the ORS until the sight gauge indicates that the ORS is “FULL”.

Note: If equipped, you may also use the “FULL” indicator light (1) in the service center in order to determine when the ORS is full.

Reference: For more information, refer to Operation and Maintenance Manual, “Service Center”.

i02539506

Oil Renewal System Oil Level - Check (If Equipped)

SMCS Code: 1348-535-FLV

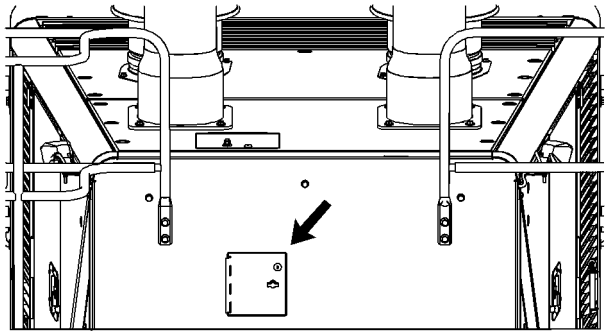


Illustration 207 g01450909

1. Park the machine on level ground. Lower the work tool to the ground. Engage the parking brake and stop the engine.
2. The oil level gauge for the ORS is located inside the small access door on the front of the engine compartment. Open the access door.
3. The oil level should be visible in the sight gauge.
4. If the oil level is low, SAE 10W30 oil should be added. For more information , refer to Operation and Maintenance Manual, “Oil Renewal System Oil - Add”

Note: Keeping a daily maintenance log of all the additions of oil is necessary for determining whether the ORS is working properly.

i04411824

Radiator Core - Clean

SMCS Code: 1353-070-KO

Access the radiator cores through the side grill assemblies located at the rear of the machine.

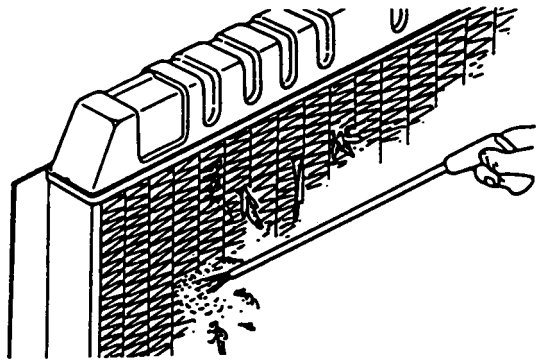


Illustration 208 g00100062

Compressed air, high-pressure water, or steam can be used to remove dust and other debris from the radiator core. However, the use of compressed air is preferred.

Reference: Refer to Special Publication, SEBD0518, “Know Your Cooling System” for the complete procedure for cleaning the radiator core.

i02913523

Refrigerant Dryer - Replace

SMCS Code: 7322-510

⚠ WARNING

Personal injury can result from contact with refrigerant.

Contact with refrigerant can cause frost bite. Keep face and hands away to help prevent injury.

Protective goggles must always be worn when refrigerant lines are opened, even if the gauges indicate the system is empty of refrigerant.

Always use precaution when a fitting is removed. Slowly loosen the fitting. If the system is still under pressure, release it slowly in a well ventilated area.

Personal injury or death can result from inhaling refrigerant through a lit cigarette.

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.

Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

Use a certified recovery and recycling cart to properly remove the refrigerant from the air conditioning system.

NOTICE

If the refrigerant system has been open to the outside air (without being plugged) for more than 30 minutes, the receiver-dryer must be replaced. Moisture will enter an open refrigerant system and cause corrosion which will lead to component failure.

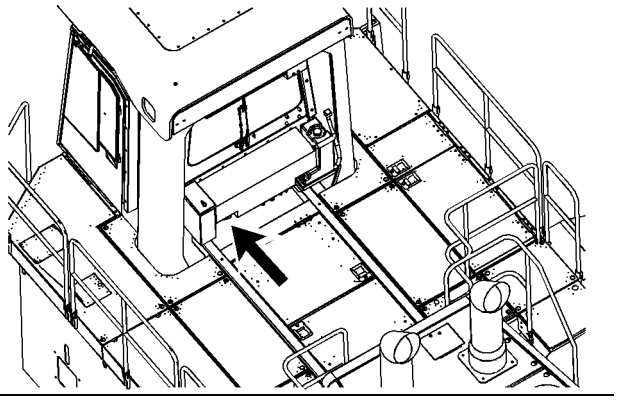


Illustration 209 g01449602

The refrigerant dryer is located behind the cab.

Refer to Service Manual, SENR5664, “Air Conditioning and Heating System with R-134a Refrigerant for All Caterpillar Machines” for the proper procedure to change the receiver-dryer assembly and for the procedure to reclaim the refrigerant gas.

i02510283

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7325-040

NOTICE
Do not attempt to straighten the ROPS structure. Do not repair the ROPS by welding reinforcement plates to the structure.

If there are any cracks in the welds, in the castings, or in any metal section of the ROPS, consult your Caterpillar dealer for repairs.

There are access covers near the base of the ROPS. Remove the access covers from both sides of the rollover protective structure (ROPS).

Inspect the ROPS for damage and for bolts that are loose or damaged. Use original equipment parts only to replace bolts that are damaged or missing. Tighten the mounting bolts to a torque of 1600 ± 200 N·m (1200 ± 150 lb ft).

Note: Apply oil to all bolt threads before installation. Failure to apply oil can result in improper bolt torque.

i04423622

Seat Belt - Inspect

SMCS Code: 7327-040

Always inspect the condition of the seat belt and the condition of the seat belt mounting hardware before you operate the machine. Replace any parts that are damaged or worn before you operate the machine.

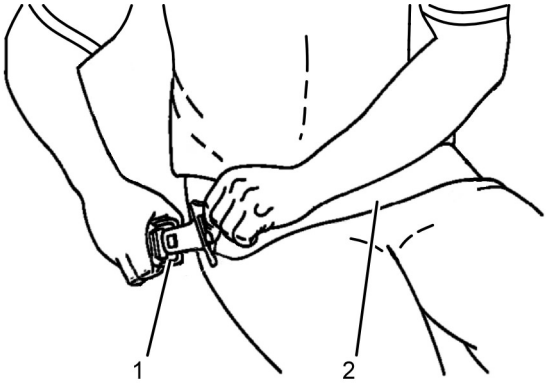


Illustration 210 g02620101
Typical example

Inspect buckle (1) for wear or for damage. If the buckle is worn or damaged, replace the seat belt.

Inspect seat belt (2) for webbing that is worn or frayed. Replace the seat belt if the webbing is worn or frayed.

Inspect all seat belt mounting hardware for wear or for damage. Replace any mounting hardware that is worn or damaged. Make sure that the mounting bolts are tight.

If your machine is equipped with a seat belt extension, also perform this inspection procedure for the seat belt extension.

Contact your Cat dealer for the replacement of the seat belt and the mounting hardware.

Note: The seat belt should be replaced within 3 years of the date of installation. A date of installation label is attached to the seat belt retractor and buckle. If the date of installation label is missing, replace belt within 3 years from the year of manufacture as indicated on belt webbing label, buckle housing, or installation tags (non-retractable belts).

i04421974

Seat Belt - Replace

SMCS Code: 7327-510

The seat belt should be replaced within 3 years of the date of installation. A date of installation label is attached to the seat belt retractor and buckle. If the date of installation label is missing, replace belt within 3 years from the year of manufacture as indicated on belt webbing label, buckle housing, or installation tags (non-retractable belts).

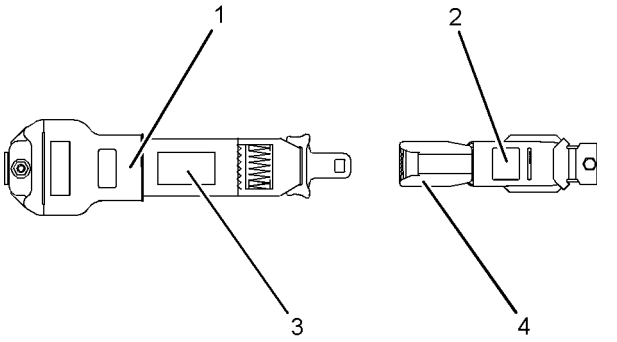


Illustration 211 g01152685

Typical Example

(1) Date of installation (retractor)
(2) Date of installation (buckle)
(3) Year of manufacture (tag) (fully extended Web)
(4) Year of manufacture (underside) (buckle)

Consult your Cat dealer for the replacement of the seat belt and the mounting hardware.

Determine age of new seat belt before installing on seat. A manufacture label is on belt webbing and imprinted on belt buckle. Do not exceed install by date on label.

Complete seat belt system should be installed with new mounting hardware.

Date of installation labels should be marked and affixed to the seat belt retractor and buckle.

Note: Date of installation labels should be permanently marked by punch (retractable belt) or stamp (non-retractable belt).

If your machine is equipped with a seat belt extension, also perform this replacement procedure for the seat belt extension.

i01547608

Seat Side Rails - Adjust

SMCS Code: 7312-025

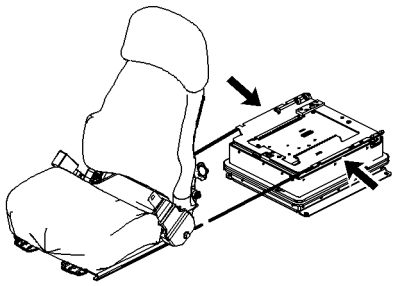


Illustration 212 g00804394

Caterpillar recommends adjusting the side rails after the initial 500 hours of machine operation. After the initial 500 service hours, perform this procedure when it is necessary.

Reference: Refer to Service Manual, SENR6615, “Contour Series Seat” for the adjustment procedure.

i03694709

Secondary Steering - Test

SMCS Code: 4300-081-SST; 4300-081-SE; 4324-081; 4324

⚠ WARNING

The service brake must be checked in order to ensure proper operation before you test the supplemental steering system.

Personal injury, death, or property damage could occur if the supplemental steering system is tested and the service brake is not operational.

Test the service brake before you test the supplemental steering system.

Perform the following procedure if your machine is equipped with a ground driven supplemental steering and if the procedure is required by local regulations.

Ensure that there are no hazards in the test area. The test area must be unobstructed and level. Operate the machine in second gear.

Ensure that all air tanks and accumulators are properly charged. Ensure that there is no load in the work tool. Position the machine with the bucket or the work tool in the carry position with the machine in neutral. Release the parking brake. Apply the service brakes and put the engine at low idle. Ensure that The area around the machine is clear of personnel. Shift the transmission to second gear forward and slowly release the service brakes. Moderately increase the engine speed to high idle. Shift the transmission to neutral. Turn the ignition to the OFF position. Allow the machine to coast.

While the machine is in motion, turn the machine to the left and to the right. If the machine responds to the steering input, the supplemental steering system is operating. Stop the machine with the service brakes. Apply the parking brake. The machine can then be returned to normal operation.

If there is no response to the steering input, the supplemental steering system is not operating. Stop the machine immediately. Repair the supplemental steering system before returning the machine to service.

i03688974

Service Brake Wear Indicator - Check

SMCS Code: 4255-535-IND

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

This procedure requires two people. One person must engage the service brakes and the other person must measure the disc wear. Care must be taken when you perform this procedure. Oil leakage from the brake system will occur. Keep all other personnel away from the machine or in sight of the operator.

1. Park the machine on a level surface away from other equipment and other personnel and lower the implement to the ground. Place the transmission in NEUTRAL. Engage the parking brake and turn off the engine.

2. Install the steering lock and chock the wheels.

3. Start the engine in order to build brake system pressure.

4. Stop the engine. Allow the axle oil to settle before proceeding to the next step.

Note: Keep the engine off when the brake wear is measured.

5. Push the button on the top of each axle breaker relief valve in order to relieve any pressure.

Note: Refer to Operation and Maintenance Manual, “Axle Breaker Relief Valve - Clean” for the axle breaker relief valve locations.

6. Place a suitable container below the plug in order to collect oil leakage from the brake system.

7. Press and hold the service brake pedal.

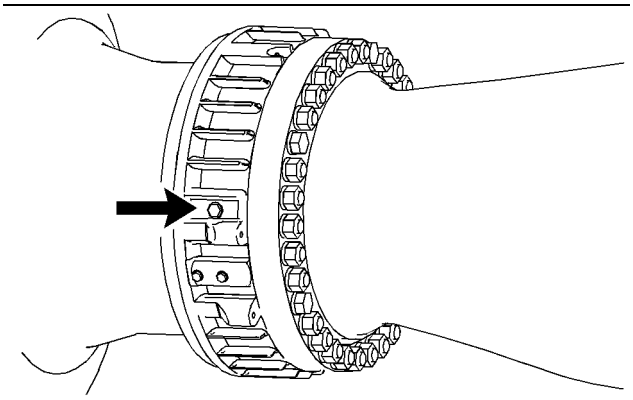


Illustration 213 g01446483

8. Remove the plug.

NOTICE
Do not allow the brake piston to retract while the pin is installed in the plug hole. This could cause the pin to break off when the brake piston retracts. It is possible for broken pieces of the tool to fall into the brake housing and cause damage.

9. Insert a FT3105 brake wear gauge into the inspection hole.

   If the brake wear gauge does not drop all the way into the inspection hole, the brake wear is less than 50%. Proceed to step 12.

If the brake wear gauge drops all the way into the inspection hole, the brake wear is greater than 50%. Proceed to step 10.

10. Insert a FT3104 brake wear gauge into the inspection hole.

If the brake wear gauge does not drop all the way into the inspection hole, the brake wear is between 50% and 75%. Proceed to step 12.

If the brake wear gauge drops all the way into the inspection hole, the brake wear is greater than 75%. Proceed to step 11.

11. Insert a FT3103 brake wear gauge into the inspection hole.

If the brake wear gauge does not drop all the way into the inspection hole, the brake wear is between 75% and 100%. Brake service should be scheduled soon.

If the brake wear gauge drops all the way into the inspection hole, the brake wear is greater than 100%. Brake service should be scheduled immediately.

12. Remove the brake wear gauge.

13. Release the service brake pedal.

14. Install the plug.

15. Clean up spilled oil.

16. Repeat steps 1 through 15 for each service brake.

i02916944

Steering Cylinder Bearings - Lubricate

SMCS Code: 4303-086-BD

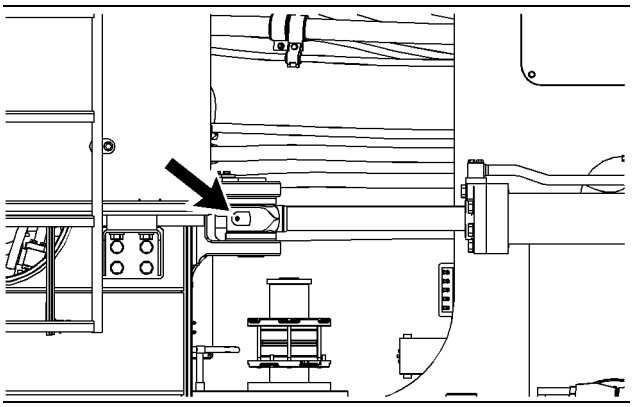


Illustration 214 g01278462

1. Wipe off the grease fittings for the rod end of the steering cylinders. There is one fitting on the rod end of both steering cylinders.

2. Apply lubricant through the grease fittings.

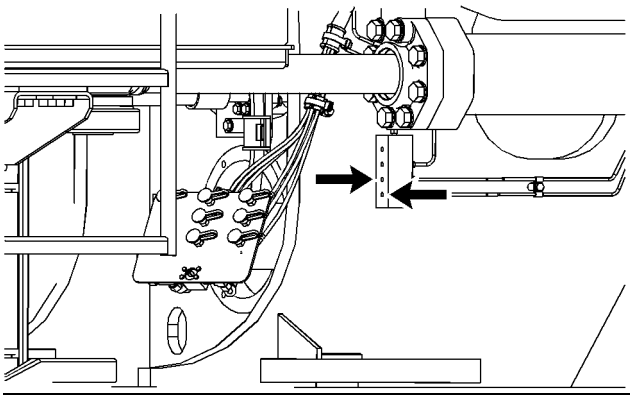


Illustration 215 g01450458

3. Wipe off the remote grease fittings on the right side of the machine.

4. Apply lubricant through the fittings.

i02305841

Tire Inflation - Check

SMCS Code: 4203-535-AI

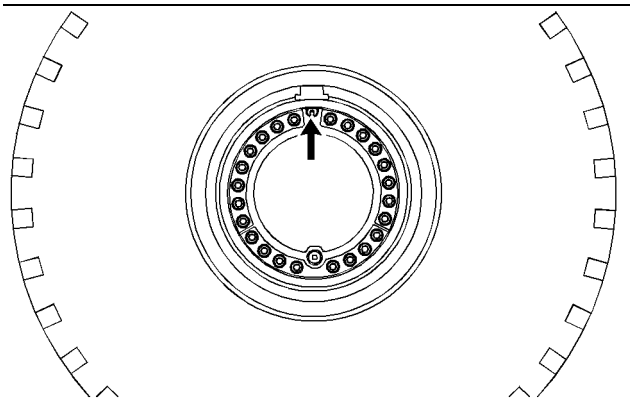


Illustration 216 g01160201

Always obtain proper tire inflation pressures and maintenance recommendations for the tires on your machine from your tire supplier. Measure the tire pressure on each tire.

Inflate the tires with nitrogen , if necessary.

Reference: Refer to the “Tire Inflation Information” section of the Operation and Maintenance Manual for more information.

i02512909

Transmission Magnetic Screen - Clean

SMCS Code: 3030-070-MGS; 3159-070-MGS

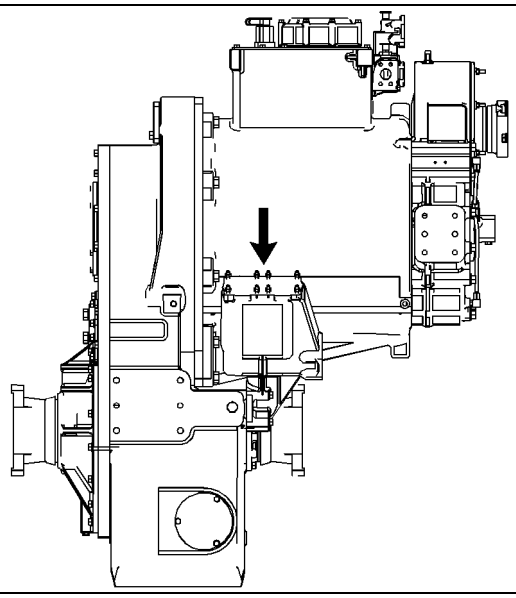


Illustration 217 g01257508

The transmission magnetic screen is located on the left side of the transmission.

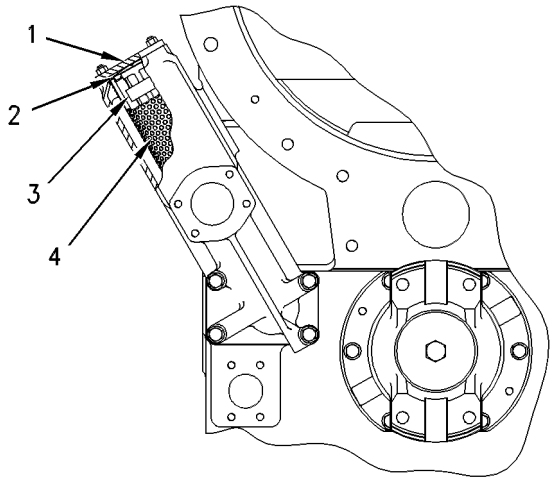


Illustration 218 g00110013

1. Park the machine on level ground. Lower the attachment to the ground and apply slight downward pressure. Engage the parking brake and stop the engine.
2. Remove covers (1) and seals (2).
3. Remove screen tube assemblies (3) and suction screens (4).
4. Wash the screen tube assemblies and the suction screens in clean, nonflammable solvent. Allow the components to dry.
5. Install screen tube assemblies (3) and suction screens (4).
6. Inspect seals (2) for damage. Replace the seals, if necessary.
7. Install seals (2) and covers (1).

i02539319

Transmission Oil - Change

SMCS Code: 3030-044

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Operate the machine in order to warm the oil.
2. Park the machine on level ground. Lower the attachment to the ground and apply slight downward pressure. Engage the parking brake and stop the engine.

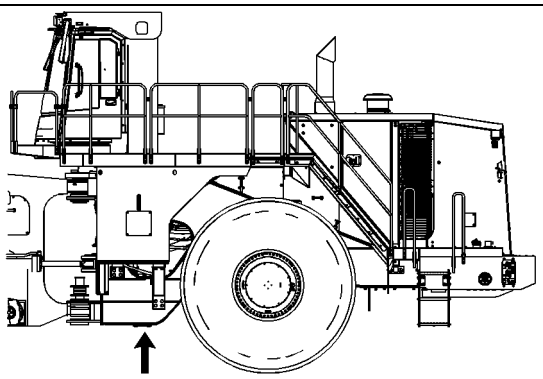


Illustration 219 g01271356

3. The transmission drain plug is located on the bottom of the transmission case and the plug is accessible from the underside of the machine. Remove the transmission drain plug and allow the oil to drain into a suitable container.

4. Clean the drain plug and install the drain plug.

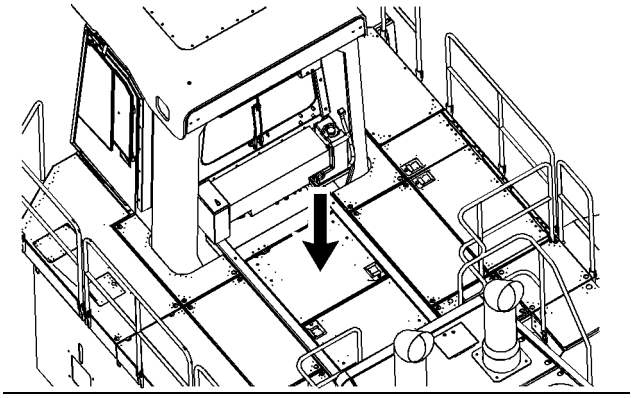


Illustration 220 g01271357

5. The access door for the transmission filters is located behind the cab in the middle of the cab platform. Open the access door.

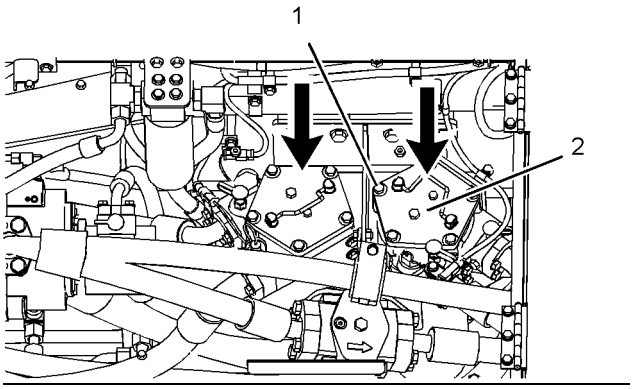


Illustration 221 g01271358

There are two transmission filters.

6. Remove the five bolts (1) and remove the cover (2).

7. Remove the used filter element. Be sure to dispose of the used filter properly.

8. Install a new filter element and replace the cover.

9. Install the cover and the five bolts.

10. Repeat steps 6 through 9 for the other filter.

11. Close the access door.

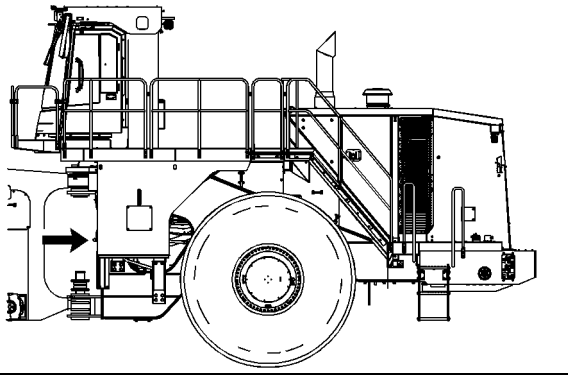


Illustration 222 g01271359

12. The transmission oil filler cap is located near the articulation joint on the left side of the machine. Remove the filler cap and add 170 L (45 US gal) of transmission oil.

13. Clean the filler cap and install the filler cap.

14. Start and run the engine at low idle. Inspect the transmission for leaks.

15. Operate the transmission direction controls in order to circulate the transmission oil.

16. Move the transmission direction control to NEUTRAL. Engage the parking brake. Inspect the entire power train for leaks.

17. The sight gauge is located below the transmission oil filler cap on the left side of the machine. The oil level must be within the sight gauge before you operate the machine.

18. If the system requires additional oil, slowly remove the filler cap and add oil through the filler tube until the oil level reaches the proper range.

19. Clean the filler cap and install the filler cap.

Fast Fill Port

If your machine is equipped with a service center, you may drain the transmission oil through the fast fill port or you may add the transmission oil through a fast fill port.

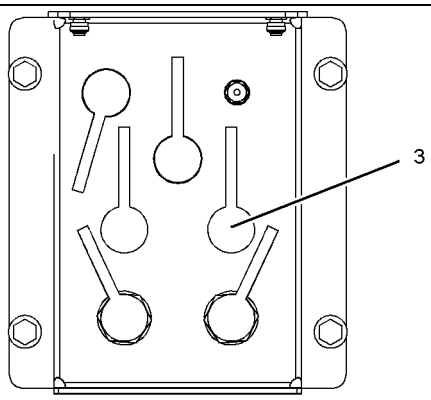


Illustration 223 g01450910

1. Remove the dust cover (3).

2. Attach the hose to the male coupling. Use a 126-7538 Nozzle for this port.

3. Drain the oil or add the oil, as needed.

Reference: For more information, refer to Operation and Maintenance Manual, “Service Center”.

i02540558

Transmission Oil Filter - Replace

SMCS Code: 3067-510

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Operate the machine in order to warm the oil.

2. Park the machine on level ground. Lower the attachment to the ground and apply slight downward pressure. Engage the parking brake and stop the engine.

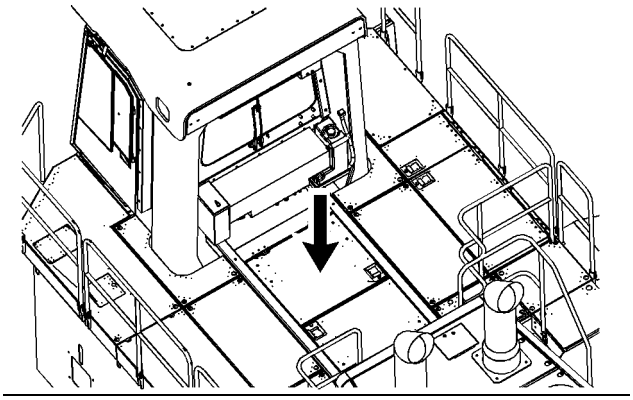


Illustration 224 g01271357

3. The access door for the transmission filter is located behind the cab in the middle of the cab platform. Open the access door.

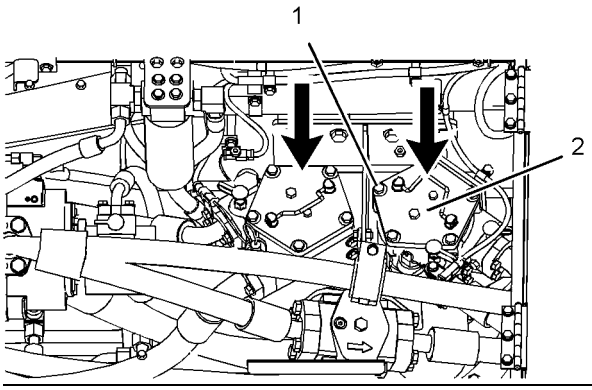


Illustration 225 g01271358

4. Remove the five bolts (1) and remove the cover (2).

5. Remove the used filter element. Be sure to dispose of the used filter properly.

6. Install a new filter element and replace the cover.

7. Install the cover and the five bolts.

8. Repeat steps 4 through 7 for the other filter.

9. Close the access door.

i02540584

Transmission Oil Level - Check

SMCS Code: 3030-535-FLV

1. Operate the machine until the transmission oil is warm.

2. Park the machine on level ground and lower all attachments to the ground with a slight downward pressure.

3. Place the transmission in the NEUTRAL position. Engage the parking brake and leave the engine on at low idle.

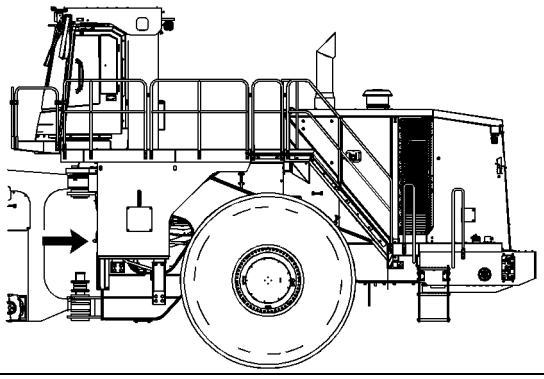


Illustration 226 g01271359

The transmission oil level gauge is near the articulation joint on the left side of the machine.

4. Check the oil level. The oil level must be within the sight gauge before you operate the machine.

5. If the system requires additional oil, slowly remove the filler cap and add oil through the filler tube until the oil level reaches the proper range. The filler tube for the transmission is located above the sight gauge on the left side of the machine.

6. Clean the cap and install the cap.

7. Maintain the oil level within the proper range on the sight glass, which is at the centerline of the drive shaft.

i02540655

Transmission Oil Sample - Obtain

SMCS Code: 3080-008; 7542

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

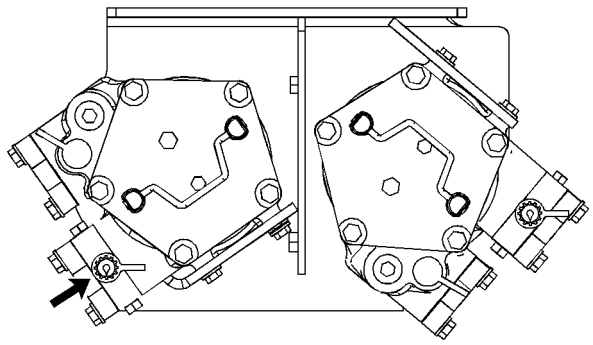


Illustration 227 g01272039

The sampling valve for the transmission is located at the base of the filters.

Reference: Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information about obtaining a fluid sample.

i01394768

Turbocharger - Inspect

SMCS Code: 1052-040

If the turbocharger fails during engine operation, severe damage to the turbocharger compressor wheel and to the entire engine can result.

Turbocharger bearing failures can cause large quantities of oil to enter the intake system and the exhaust system. Loss of engine oil can result in serious engine damage.

Do not continue to operate the engine when a turbocharger bearing failure is accompanied by a significant loss of engine performance. Engine smoke and speeding up of the engine with no load are characteristics of a loss of engine performance.

Reference: For more information about inspecting the turbocharger, refer to the appropriate Service Manual for your machine's engine.

i01892835

Window Washer Reservoir - Fill

SMCS Code: 7306-544

NOTICE
When operating in freezing temperatures, use Caterpillar nonfreezing window washer solvent or equivalent. System damage can result from freezing.

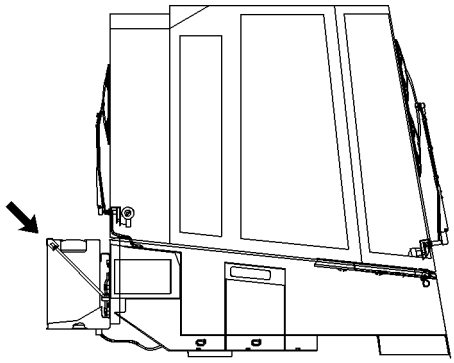


Illustration 228 g00952003

The window washer reservoir is located behind the cab.

Fill the reservoir with window washer solvent, as needed.

i01906590

Window Wiper - Inspect/Replace

SMCS Code: 7305-040; 7305-510

Inspect the condition of the wiper blades. Replace the wiper blades if the wiper blades are worn or damaged or if streaking occurs.

i04412316

Windows - Clean

SMCS Code: 7310-070

Clean the outside of the windows from the ground, unless handholds are available.

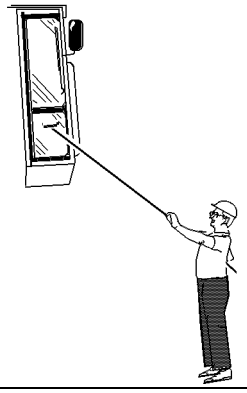


Illustration 229 g00566124
Typical example

Cleaning Methods

Commercial Window Cleaner

Apply the cleaner with a soft cloth. Rub the window with moderate pressure until all the dirt is removed. Allow the cleaner to dry. Wipe off the cleaner with a clean soft cloth.

Soap and Water

Use a clean sponge or a soft cloth. Wash the windows with a mild soap or with a mild detergent. Also use plenty of lukewarm water. Rinse the windows thoroughly. Dry the windows with a moist chamois or with a moist cellulose sponge.

Stubborn Dirt and Grease

Wash the windows with a good grade of naphtha, of isopropyl alcohol, or of Butyl Cellosolve. Then, wash the windows with soap and with water.

Polycarbonate Windows (If equipped)

Wash polycarbonate windows with a mild soap or detergent. Never use a cleaning solvent on polycarbonate windows.

Wash polycarbonate windows with warm water and a soft sponge, or damp cloth. Never use a dry cloth or paper towels on polycarbonate windows.

Rinse the windows with a sufficient amount of clean water.